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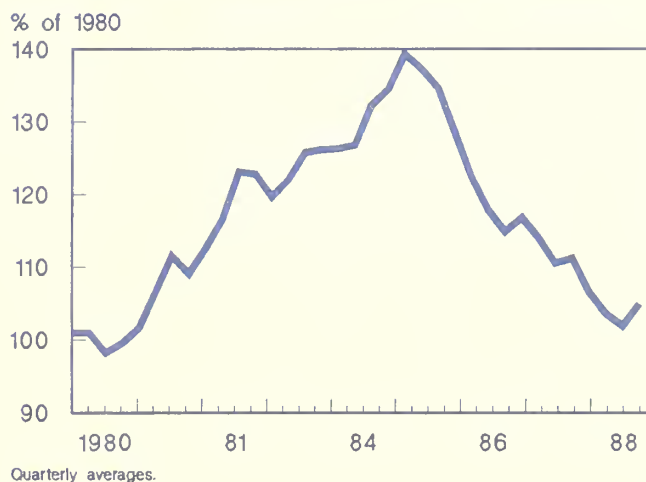
WAS-53
December 1988

World Agriculture

Situation and Outlook Report

An exchange rate index weighted
by U.S. agricultural export
markets; **see page 7**

Real Agricultural Exchange Rate of the Dollar



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Approved by the World Agricultural Outlook Board. The next summary of the *World Agriculture Situation and Outlook Report* is scheduled for release in March 1989. Summaries of Situation and Outlook reports, including tables, may be accessed electronically through the USDA EDI system. For details, call (202) 447-5505.

Note: Tons are metric, dollars are U.S., and rice is on a milled basis unless specified otherwise.

World Agriculture Situation and Outlook Report is published three times a year. Subscriptions are available from the Economic Research Service by calling (301) 953-2515 or writing USDA/ERS, Box 1608, Rockville, MD 20850. Rates: 1 year \$10, 2 years \$19, 3 years \$27. Foreign customers add 25 percent for subscriptions mailed outside the United States. Make check payable to USDA/ERS.

Subscriptions are also available from the U.S. Government Printing Office.

SUMMARY

The outlook for world economic growth is generally positive, and should bolster U.S. exports. In aggregate, industrial economies outside the United States are expected to grow around 3.3 percent in 1988 and near 3 percent in 1989. U.S. economic growth is forecast at 3.8 percent in 1988 and 3.1 percent in 1989.

Japan's outlook is the brightest among the industrialized countries, with growth expected to reach 5.1 percent in 1988, and 3.8 percent in 1989. Rising consumer spending and fixed investment are the main sources.

European growth is seen at 3.1 percent in 1988, fueled by higher investment spending, and much stronger growth in Germany than previously projected. German growth for 1988 is placed at 3 percent on the strength of stronger export performance, particularly in capital goods.

In 1989, European growth is seen as slipping somewhat, to near 2 percent. These expectations are guided by the belief that attempts by Germany to narrow its fiscal deficit, and by Italy and the United Kingdom to correct balance-of-payments problems, will result in slower growth.

The outlook for less developed countries (LDC's) as a whole is for growth of 2.9 percent in 1988 and 3.4 percent in 1989, decidedly modest figures in light of population pressures. Latin America is the only region expected to show any marked deterioration in 1988 and 1989. The outlook shows a recession in 1988, with the region's economy contracting by 0.5 percent. Growth will return in 1989, but that will be only in the 1- to 1.5-percent range.

In contrast, *Asian growth* in 1988 seems set to increase to 7.3 percent. While not quite as strong in 1989, growth in Asia should remain in the 5.5- to 7-percent range. Asia's newly industrialized countries (NIC's), growing at nearly 9 percent, account for much of the rise as they boost exports to other Asian countries. Thailand, the Philippines, Malaysia, and Indonesia are showing better prospects as the result of

improvements in commodity prices and expectations for better manufactured export performance.

With new strength in real economic activity comes the expectation of *higher inflation*, and LDC's are responsible for the lion's share of this movement. LDC prices seem likely to rise by nearly 110 percent in 1988, and by over 130 percent in 1989. Most of the increase comes from Latin America, which is expected to see inflation of near 300 percent in 1988, and 350 percent in 1989. Argentina and Brazil are expected to experience the severest acceleration, with inflation approaching 400 and 800 percent, respectively, in 1989. Asian countries, on the other hand, should not see inflation of beyond 7 percent in either 1988 or 1989.

Overall industrial-country inflation, unlike LDC and world inflation, shows little change from the previous outlook and is expected to be around 3.5 to 4 percent in 1988 and 1989. However, estimated inflation in certain countries, particularly the United States, the United Kingdom, and Italy, could face upward revisions if economic growth continues at its present pace.

U.S. agricultural exports are expected to continue rising in fiscal 1989, growing \$1 billion to \$36.5 billion. However, volume is likely to fall 8 percent to 136 million tons as the U.S. share of world trade shrinks for some drought-affected products. As world stocks decrease, prices for wheat, corn, and soybeans may be at their highest since 1983-84. U.S. cotton and oilseed exports are expected to decline in value, but a \$2.5-billion increase for grain and feed shipments will be more than offsetting. Favorable exchange rates and relatively strong world economic growth will help sustain exports of high-value products near fiscal 1988's record \$16.4 billion.

U.S. agricultural imports are expected to match fiscal 1988's record \$21 billion. Imports of competitive products could decline for the first time since fiscal 1982. The U.S. agricultural trade surplus is expected to rise \$1 billion in 1989 to \$15.5 billion.

THE WORLD ECONOMY AND EXCHANGE RATES

The outlook for the world economy continues positive, with almost no change from the previous outlook. Growth is being fueled by stronger-than-expected performance in certain industrialized countries, along with greater forecast volume of world trade. In both 1988 and 1989, real world growth is expected to be near 3 percent, though 1989 growth could turn out below 1988. Without the United States, the view for world growth is essentially the same. However, these figures mask some important regional differences. In particular, Latin American growth is expected to stagnate in 1988 and 1989, while Europe appears to be growing at a much faster pace for 1988 than previously anticipated.

The strong overall growth indicates that there is somewhat less worry about the world economy, but the continuing debt problems among the developing countries (LDC's), along with the twin U.S. deficits, still pose significant problems. Also, while strides have been made toward more balanced growth among the industrialized nations, European economic activity is still expected to be disappointing in 1989. One could also note worries about the recently remanifested weakness of the dollar.

Along with stronger world growth comes a forecast of accelerating inflation, with total world inflation almost doubling to near 21 percent in 1988. The rate of increase will be less severe in 1989, but inflation is still expected to reach around 26 percent. However, that overall figure cloaks a fairly marked difference in inflationary expectations between developed countries (not so bad) and LDC's (quite severe, particularly in Latin America).

Heightened inflationary expectations, along with already-exhibited economic strength, led to interest rates rising in most of the major developed countries, though rates seem to have stabilized for now. However, the possibility of more declines in the dollar could result in further upward pressure on U.S. interest rates, while stronger fears of inflation in Europe could lead to higher rates there.

When U.S. interest rates began rising, the dollar had entered a period of strength. That most certainly has ended, with the dollar now standing some 10 percent below its end-August peak. Given the likelihood that the U.S. trade deficit will remain large, along with worries about the U.S. federal deficit, the expectation is for a further, possibly marked, depreciation of the dollar in 1989.

World Economic Activity

As noted above, the outlook for growth is generally positive, which should bolster U.S. exports, rather than be a

neutral factor as previously thought. On an aggregate basis, industrial country growth (less the United States) should be around 3.3 percent in 1988 (an improvement over the previous outlook), and near 3 percent in 1989 (essentially unchanged from the prior outlook). The outlook for LDC's as a whole is for growth at 2.9 percent in 1988 and 3.4 percent in 1989, decidedly modest figures in light of population pressures.

Developed Country Growth

Japan's outlook is the brightest among the industrialized countries, with growth expected to reach 5.1 percent in 1988 and 3.8 percent in 1989. Rising consumer spending and fixed investment are the main sources.

European growth is seen at 3.1 percent in 1988, a distinct upturn from the previous forecast of 2.6 percent. The revision is largely the result of higher investment spending in Europe generally, and much stronger growth in Germany than previously projected. Expected 1988 German growth has been revised from an earlier 1.5 to 2 percent to the 3-percent range on the strength of stronger export performance, particularly in capital goods.

European growth is seen as slipping somewhat in 1989, to near 2 percent. These expectations are guided by the belief that attempts by Germany to narrow its fiscal deficit, and by Italy and the United Kingdom to correct balance-of-payments problems, will result in slower growth.

Developing Country Growth

Latin America is the only region expected to show any marked deterioration in 1988 and 1989. The outlook shows a recession in 1988, with the region's economy contracting by 0.5 percent. Growth will return in 1989, but that will be of small consequence, with the figure expected to be only in the 1- to 1.5-percent range. This forecast is generated by declining prospects in Mexico and Brazil. In particular, Mexico's economy is seen as experiencing a tough 1988 and 1989, contracting 1.1 and 1.7 percent, respectively. The decline comes from the Government's tighter fiscal policy, and a continuing freeze on wages, prices, and the exchange rate. Brazil's economy is also expected to contract in 1988 by nearly 2 percent, but is expected to recover in 1989, growing between 2 and 2.5 percent.

In contrast, Asian growth in 1988 seems set to move upward from the previous year by almost 1.5 percent, to 7.3 percent. While not quite as strong in 1989, growth in Asia and the NIC's should remain in the 5.5- to 7-percent range. The newly industrialized countries (NIC's), growing at nearly 9 percent, account for much of the rise as they boost exports to other Asian countries. Thailand (9-percent growth in 1988), the Philippines (6 percent), Malaysia (8.8 percent), and Indonesia (4.2 percent) are showing better prospects as

World and regional economic growth						
Calendar year	1984	1985	1986	1987	1988	1989
	Percent change					
World	4.1	3.0	2.8	3.0	3.4	2.9
United States	6.6	3.0	2.8	3.4	3.8	3.1
World less U.S.	3.2	3.0	2.7	2.9	3.3	2.8
Developed countries	4.5	3.1	2.5	3.1	3.7	2.7
Less U.S.	3.4	3.3	2.4	3.0	3.6	2.5
EC-12	2.3	2.4	2.4	2.5	3.1	2.0
Japan	5.1	4.7	2.5	4.0	5.1	3.8
Developing countries	3.1	2.5	2.6	3.2	2.9	3.4
Oil exporters	1.3	-0.1	-2.1	1.4	1.3	2.0
Non-oil exporters	4.4	4.2	5.8	4.4	3.9	4.4
Latin America	3.3	3.6	3.7	2.3	-0.5	1.4
Africa & Middle East	1.1	0.0	-1.2	1.8	2.6	3.3
Asia	5.4	4.0	5.8	5.9	7.3	6.1
NIC's	8.9	3.7	9.9	11.1	8.6	7.0
CPE's	3.7	2.9	3.9	2.6	3.1	3.3

Sources: IMF, The WEFA Group Inc., ERS.

the result of improvements in commodity prices and expectations for better manufactured-export performance.

Inflation

With new strength in real economic activity comes the expectation of higher inflation, and LDC's are responsible for the lion's share of this movement. LDC prices seem likely to rise by nearly 110 percent in 1988, and by over 130 percent in 1989. Most of the increase comes from Latin America, which is expected to see inflation of near 300 percent in 1988 and 350 percent in 1989. Argentina and Brazil are expected to experience the severest acceleration in prices, with inflation approaching 400 and 800 percent, respectively, in 1989. Asian countries, on the other hand, should not see inflation of beyond 7 percent in either 1988 or 1989.

Overall industrial-country inflation, unlike LDC and world inflation, shows little revision from the previous outlook and is expected to be around 3.5 to 4 percent in 1988 and 1989. However, estimated inflation in certain developed countries, particularly the United States, the United Kingdom, and Italy, could face upward revisions if economic growth continues at its present pace.

Commodity Prices

Commodity prices have retreated somewhat from their midyear highs (table). While prices are generally above December 1987 levels, prices paid to LDC's declined just over 2.5 percent since June. These movements are modest, given that on a December-to-December basis the all-commodities index rose 30.8 percent in 1987. From the end of 1987 to June, prices rose 13.3 percent. For the developing-countries index, the December-to-December 1987 increase was 26.8 percent, while the end of 1987-to-June increase was 7.2 percent. The general recovery in prices reflected better-than-expected world economic growth

and short supplies of some commodities (particularly metals). While these prices have declined in the latter half of 1988, they are good news for LDC's.

Commodity price strength reinforces the notion that prices have passed their low point and should edge upwards in the future, but they still remain quite depressed in real terms. Overall real commodity prices (as measured by commodity prices relative to manufactures export prices) were down by almost 2.5 percent in 1987, while LDC real prices declined by about 7.5 percent. Over the first 9 months of 1988, overall and LDC real commodity prices most likely registered further declines. For the most part, real commodity prices remain at, or near, 1930's levels.

The outlook does not show any major recovery for these prices, though stronger world growth would help. Both nominal and real prices are seen rising in 1989, but at best real prices (assuming no stronger growth) are seen as rising in the 1- to 2-percent range. This holds for both the all-commodities and developing-countries indexes.

Oil Prices

Over the last quarter oil prices continued to be quite soft, with Saudi Light recently below \$10.00 a barrel and West Texas Intermediate recently below \$14.00. Comparable year-ago figures would be \$17 and \$19, respectively. The softness was the result of OPEC production, which some estimates placed at 22 to 23 million barrels per day (bpd), well beyond demand. In addition, inventories remain high.

However, an OPEC agreement to cut production some 20 percent to 18.5 bpd may push prices substantially higher. While the agreement places the reference price at \$18 per barrel, many estimates show oil prices rising only to the \$15 to \$16 level. The immediate response had Saudi Light nearing \$12.50 and West Texas just above \$15.00. No strong near-term runup in prices is expected, since the agreement is not set to go into effect until the first of the year, and OPEC members may produce at high levels until then. Such actions would, of course, serve to augment already plentiful stocks, and defer any future price rises until stocks decline. There are also some doubts over OPEC's ability to stick to

Nonfuel commodity and manufactures export prices (1980=100, U.S. dollar terms)							
	1984	1985	1986	1987	December 1987	June 1988	September 1988
Nonfuel commodity prices							
All commodities	87.4	76.0	73.1	79.1	92.6	104.9	96.8
Developing countries	86.7	75.6	74.7	77.2	90.3	96.8	87.9
Developed countries	88.1	76.4	71.7	81.5	94.8	111.8	104.4
Manufactures export prices							
Developing countries	90.8	86.5	73.5	68.3*	-	-	-
Developed countries	87.6	87.2	99.2	110.0	-	-	-

Note: * = Based on 3 quarters' data.

Source: IMF, World Economic Outlook and International Financial Statistics.

the new production levels, with the United Arab Emirates already stating that the announced quotas do not "represent its official quota." [Tim Baxter (202) 786-1706]

Dollar Exchange Rates

Like Samson, the dollar has been shorn of its mid-1988 strength. This comes as no surprise, with the dollar standing some 10 percent below end-August highs as measured by the Federal Reserve Board's nominal 10-country index. It is anticipated that the dollar will see a further, possibly strong, depreciation in 1989. This view results mainly from expectations that the U.S. current account and Federal deficits are likely to remain substantial for the foreseeable future.

The rise in inflationary expectations, along with already exhibited economic strength, led to interest rates rising in most major developed countries in the middle of 1988, after which there was a period of stability. For the United States, that stable period could well be at an end, with major banks raising their prime rate 0.5 percent, to 10.5 percent (the highest in 3-1/2 years). Expectations are growing that the Fed, in addition to having to restrain U.S. growth and inflation (especially if oil prices rise), will be forced to defend the dollar through tighter monetary policies. U.S. short-term rates have already moved up slightly, with the Federal Funds Rate at 8.3 percent and 3-month Treasury bills at 8 percent. Increasing inflationary fears in Europe could also lead to higher rates there.

USDA Agricultural Exchange Rates

In this issue we present a new chart that shows the movement of real effective exchange rates for all U.S. agricultural products, wheat, soybeans, and corn (see box for an explanation of the indexes). Not surprisingly, these indexes show the same general movements as other, more well-known measures of the dollar's value (e.g. the Federal Reserve Board's 10-country index), though the movements of the agriculture-based indexes tend to be less severe.

From their 1985 highs to their lows in early 1988, the all-product, wheat, soybean, and corn indexes registered dollar devaluations (signifying increases in price competitiveness) of 27.0, 14.5, 37.6, and 34.0 percent, respectively. After a period of stability in early 1988, those indexes recovered 5.0, 2.7, 11.0, and 5.7 percent of their value.

Bilateral Exchange Rates

The yen traded between 124 and 126 to the dollar during early summer. As of August 22 (when the dollar generally was at a near-term high) its value had reached 134.1 yen, and as of the end of November was trading near 122 yen. The mark was trading between 1.68 to 1.72 to the dollar, moved to 1.92 on August 22, and currently stands at 1.73.

Other currency values show the Canadian dollar at 1.19 (appreciating 3 percent since August 22), the French franc at 5.918 (appreciating 9 percent), the British pound at .5433 (appreciating nearly 9 percent), the Italian lira at 1285 (appreciating 9.5 percent), and the Korean won at 688 (appreciating nearly 5.5 percent).

In response to these movements, central banks were intervening in exchange markets at midyear in an attempt to hold down the dollar. They have now been forced to reverse their efforts and support the dollar. The banks will likely need to continue intervening in support of the dollar for the foreseeable future. [Tim Baxter (202) 786-1706]

WORLD TRADE AND AGRICULTURAL POLICY

U.S. Agricultural Trade

U.S. agricultural exports are expected to rise more than \$1 billion in fiscal 1989 to \$36.5 billion. However, volume is likely to fall 8 percent to 136 million tons as the U.S. share of world trade shrinks for some drought-affected products. As world stocks decrease, prices for wheat, corn, and soybeans may be at their highest since 1983-84 (table). U.S. cotton and oilseed exports are expected to decline in value, but a \$2.5-billion increase in grain and feed shipments will be more than offsetting. Favorable exchange rates and relatively strong world economic growth will help sustain exports of high-value products near fiscal 1988's record \$16.4 billion.

U.S. agricultural imports are expected to match fiscal 1988's record \$21 billion. Imports of competitive products could decline for the first time since fiscal 1982. The U.S. agricultural trade surplus is expected to rise \$1 billion in 1989 to \$15.5 billion.

U.S. wheat export volume is forecast to drop by 1.5 million tons (4 percent) due to higher prices and lower world trade. Crop shortfalls and low stocks in other major exporting countries—Canada and Argentina—will lower exportable supplies of all wheat. Sharply higher prices are resulting from the tight supply situation; consequently, the value of wheat and flour exports is forecast to rise from \$4.5 billion in 1988 to \$5.9 billion in 1989.

Coarse grain export volume is also forecast slightly lower in fiscal 1989, falling 1.8 million tons. However, higher prices could raise the value of exports more than \$1 billion. Although U.S. barley and sorghum exports could drop, corn exports are likely to increase. Strong Soviet demand and lower exportable supplies of feed quality wheat will largely account for higher expected foreign coarse grain demand.

International commodity prices

Year	Wheat				Corn		Soybeans	Soyoil	Soymeal 44%	
	U.S. 1/	Arg. 2/	Can. 3/	Aust. 4/	U.S. 5/	Arg. 2/	U.S. 5/	U.S. 6/	U.S. 6/	Ham. 7/
Dollars per metric ton										
1980	176	203	192	175	129	159	272	522	217	271
1981	176	190	194	175	135	139	272	464	223	269
1982	161	166	165	160	110	109	233	404	197	233
1983	158	138	167	161	137	133	269	518	222	255
1984	153	135	166	153	138	132	271	678	184	210
1985	137	106	173	141	114	103	214	596	140	171
1986	117	88	161	120	89	83	200	361	174	197
1987	114	89	134	115	77	80	204	349	194	215
1988										
Jan.	130	94	148	127	87	85	237	477	213	239
Feb.	132	106	151	135	88	86	237	458	203	233
Mar.	126	107	143	131	91	85	241	443	211	247
Apr.	128	108	145	133	90	81	254	474	220	258
May	130	107	152	131	90	79	271	516	247	275
June	151	125	166	158	118	121	345	606	320	336
July	151	141	209	157	130	131	335	646	284	311
Aug.	151	140	206	154	119	119	322	590	284	296
Sept.	160	152	202	160	122	121	321	552	292	318
Oct.	162	147	202	169	121	119	298	510	284	305

1/ No. 2 hard winter, ordinary protein, f.o.b. Gulf ports. 2/ F.o.b. Buenos Aires. 3/ No. 1 western red spring, 13.5% protein, in store Thunder Bay. 4/ July-June crop year, standard white, f.o.b. selling price. 5/ U.S. No. 3 yellow, f.o.b. Gulf ports. 6/ Decatur. 7/ Hamburg, f.o.b. ex-mill.

Oilseeds and products exports are forecast at 20.4 million tons and \$6.9 billion, down 8.4 million tons and \$1.1 billion, respectively, from last year. A significant reduction in U.S. soybean production and ending stock levels, and a forecast record soybean harvest in South America are contributing to this decline.

U.S. cotton exports are forecast at 1.1 million tons and \$1.5 billion. This represents a drop of 300,000 tons and \$600 million, respectively, from 1988. The lackluster export performance for U.S. cotton is based on a rise in foreign production and competitive overseas prices.

The forecast for U.S. exports of horticultural products is a record \$4.1 billion, up \$300 million from fiscal 1988's record. Export sales will continue to benefit from favorable exchange rates, relatively strong overseas economic growth, and heavy U.S. promotional activity.

Livestock, dairy, and poultry exports for fiscal 1989 are forecast to remain at a record \$6.1 billion. While overall export performance is expected to remain strong, some bearish factors do exist, steadying exports after 4 years of growth. [Stephen A. MacDonald (202) 786-1822]

Real Agricultural Exchange Rates

The value of the dollar influences U.S. agricultural exports. When the dollar appreciates against another currency, importers must pay more in local currency for the same imported goods. This means they will buy less, other things remaining equal. The opposite happens when the dollar depreciates.

This means that U.S. agricultural exporters must be conscious of the dollar's value in terms of other countries' currencies. But they need to pay particular attention to the currencies of those countries where they are interested in marketing their products.

An exchange rate that indicates the value of the dollar in terms of the currencies of the countries which buy certain U.S. agricultural products would be both broader than any single-country exchange rate and more narrowly suited to agricultural exporters' needs than the Federal Reserve Board

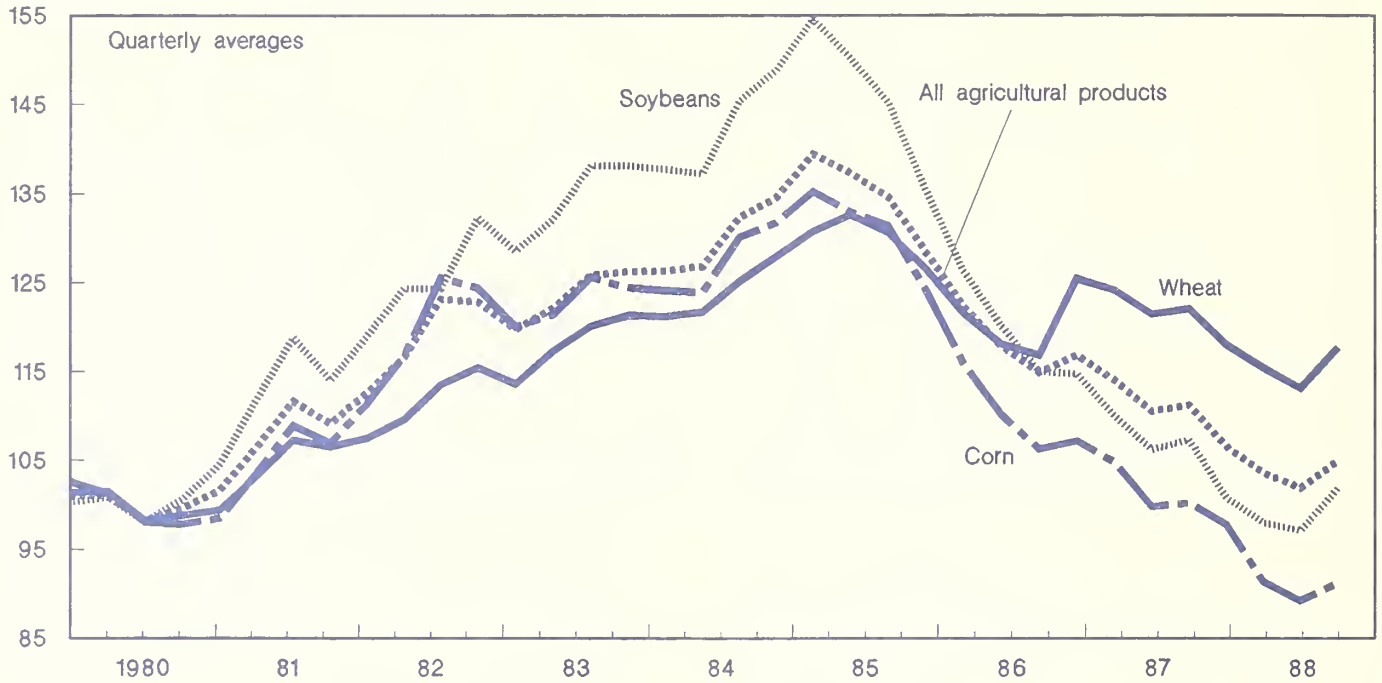
Index of trade-weighted value of the dollar. One such indicator is a weighted-average index, with the weighting reflecting country shares of U.S. agricultural shipments by commodity.

The graph shows weighted-average indexes for soybeans, wheat, corn, and cotton. The indexes have been adjusted to correct for rates of inflation in trading countries. The wheat index subsumes the 31 largest noncommunist importers of U.S. wheat, based on average values for 1983-85. Similarly, the soybean index includes the currencies of 19 countries, the corn index those of 17 countries, and the cotton index those of 26 countries.

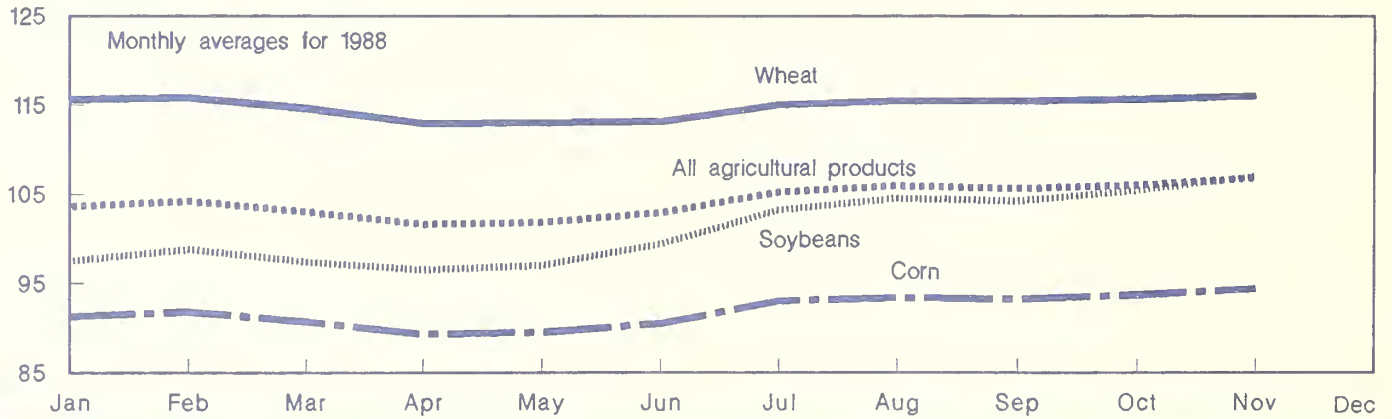
An appreciation of the dollar is represented by an upward movement in the index. The graph shows the highest dollar, as indicated in all four indexes, in the first or second quarter of 1985. The "soybean dollar," since its peak, has declined by almost 33 percent into the third quarter of 1988. By contrast, the "wheat dollar" has fallen only 12 percent. [David Stallings (202) 786-1705]

Real Agricultural Exchange Rates

% of 1980



% of 1980



RECENT DEVELOPMENTS IN INTERNATIONAL ECONOMIC COOPERATION

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Abstract: Representatives of the world's major economies have, for the first time since the beginning of floating exchange rates, coordinated action to meet specified mutual objectives. Two agreements, the so-called Plaza and Louvre agreements, outlined the framework. The first led to concerted action to lower the value of the dollar. The second provided guidelines for stabilizing exchange rates and implementing policies to reduce the U.S. balance-of-payments deficit, while also eliminating the surpluses in West Germany and Japan. The accords have generally achieved their objectives, albeit with difficulty. However, the sensitivity of the chosen policies to domestic pressures and unanticipated events is yet to be explored.

Keywords: Policy coordination, economic cooperation, exchange rates, fiscal policy, monetary policy.

It was not, literally, a dark and stormy night on September 22, 1985, but such weather would have proved an apt metaphor for the way the world economy was being viewed. The finance ministers and central bank heads from the United States, Japan, West Germany, France, and the United Kingdom (the Group of Five, or G-5) met on that date at the Plaza Hotel in New York City. They wanted to agree on steps to lower the value of the dollar, reduce the current account deficit of the United States, and thereby defuse the American clamor for increased trade protection. Further, the strained relations between the United States and both Japan and West Germany, largely a result of the trade situation, needed to be ameliorated. That meeting produced the first of two central agreements to result from a new international economic cooperation. The Plaza agreement was a coordinated statement with a clear goal—the dollar's devaluation.

Coordinated policy action means shifts in monetary and/or fiscal policies that will act, as agreed by all parties, in concert to produce changes in a set of specified indicators. An exchange rate is an excellent example of such an indicator, being a relative price of two currencies. The dollar can only fall, for example, if the Japanese agree to the yen's appreciation. At minimum, this would entail the Government of Japan's not frustrating U.S. policy goals. At best, both countries would pull in the same direction; this was the hope of the Plaza accord.

The Plaza agreement was apparently successful in lowering the value of the dollar. But other problems remained. First, the United States had a large international payments deficit, which failed to shrink in response to what had become a 2-year depreciation in the dollar. Second, both West Germany and Japan were accumulating large current account surpluses. Last, the repayment problems of debt-strapped developing nations continued to provide a drag on the world

economy. As a result, exactly 17 months after the meeting at the Plaza, on February 22, 1987, the G-5 countries were joined at the Louvre by Canada and later Italy (forming the G-7), in adopting the second central document on international cooperation, the Louvre accord. This accord also had a clear policy goal, the stabilization of exchange rates.

The finance ministers of the G-7, as representatives of the largest economies in the world, recognized that more intense coordinated action was needed to alleviate the evident imbalances in international trade. This coordination was extraordinary in that, for the first time since the Bretton Woods agreements at the end of World War II, the world's major economies were committing themselves to act in concert. Further, they were undertaking actions that might work against their perceived self-interest.

These events proved puzzling to some, particularly because of the concern with an "overvalued" dollar. A floating exchange rate system theoretically insulates domestic economic decisions from their international consequences. The generally held belief was that floating exchange rates would act as an "automatic pilot," bearing the brunt of adjustment whenever domestic policies the international side of an economy into disequilibrium. Similarly, domestic policy decisions would be unaffected by external shocks.

But clearly something was amiss. The U.S. current account deficit rose sharply from 1985 to 1986, and continued to widen in early 1987, despite an overall weighted-average decline in the dollar of 16 percent in 1985 and again in 1986 (table 1). Japanese and West German current account balances widened in 1986 (measured in both U.S. dollars and domestic currencies), despite their currencies' relative appreciations. The fall in the dollar clearly did not act to change matters fast enough.

Table 1--Selected international macroeconomic indicators, 6-month moving average percentage changes

Item	Average : 1981-83	1984	1985	1986	1987	Jan. 1984 : through Sept. 1985	Sept. 1985 : through Feb. 1987	Feb. 1987 : through Oct. 1987	Oct. 1987 : through Aug. 1988
Weighted-average exchange rates 1/									
U.S. agricultural customers--									
All products	8.2	5.7	-1.3	-12.5	-6.1	4.4	-11.1	-5.7	-7.2
Wheat	6.8	4.7	1.3	-5.8	-0.4	4.8	-4.1	-0.3	-6.9
Soybeans	11.3	6.5	-4.4	-19.6	-9.8	4.1	-18.2	-8.8	-6.9
Corn	8.4	4.7	-2.2	-17.6	-9.0	3.3	-14.5	-8.7	-9.7
Cotton	7.6	5.3	-0.3	-13.6	-7.1	4.8	-11.8	-7.2	-7.8
U.S. agricultural competitors--									
All products	10.8	7.0	1.9	-6.3	-6.1	6.9	-7.9	-6.2	-3.2
Wheat	10.4	5.8	4.6	-9.6	-6.6	7.4	-9.7	-7.4	-1.6
Soybeans	26.1	4.7	12.2	-16.5	3.3	11.2	-12.3	3.2	8.6
Corn	24.0	3.9	4.9	-19.7	-1.9	7.3	-16.9	-2.2	11.8
Cotton	4.6	0.3	5.1	-9.8	-5.3	4.1	-9.0	-7.4	5.7
Total U.S. trade	12.2	10.9	-7.7	-21.3	-10.0	5.9	-21.9	-8.8	-4.2
Monthly exchange rates (units per dollar): 2/									
Canadian dollar	1.8	6.4	4.1	1.2	-5.0	5.7	0.3	-5.4	-8.4
Japanese yen	3.9	2.9	-9.2	-33.1	-10.6	1.7	-29.5	-10.4	-12.5
French franc	21.9	13.2	-9.3	-21.0	-11.3	7.1	-23.7	-9.7	-2.3
West German mark	12.8	12.1	-8.7	-27.6	-14.0	6.9	-28.7	-11.9	-3.7
Italian lira	20.7	14.7	-0.7	-24.9	-9.0	11.3	-23.7	-6.6	-0.8
Swiss franc	9.0	14.4	-9.1	-28.3	-13.1	8.5	-29.2	-11.1	-3.1
British pound	16.1	17.4	-10.0	-3.6	-13.9	7.9	-9.0	-14.8	-9.8
South Korean won	7.5	3.1	8.5	-1.5	-8.6	5.9	-0.0	-9.4	-11.6
Taiwan new dollar	3.7	-2.1	2.2	-8.1	-20.8	-0.2	-6.5	-22.7	-8.3
Consumer prices: 3/									
United States	5.9	4.0	3.4	1.5	4.2	3.8	2.1	4.5	3.8
Canada	8.8	3.8	4.0	4.2	4.3	3.9	4.0	4.6	3.8
Japan	2.8	2.3	2.0	0.0	0.6	2.3	0.1	1.1	0.2
France	10.8	6.9	5.1	2.1	3.2	6.4	2.6	3.4	2.6
West Germany	4.8	1.9	2.0	-0.7	0.8	2.2	-0.4	1.1	1.1
Italy	15.1	9.5	8.7	4.8	5.0	9.4	5.2	5.0	5.0
Switzerland	4.7	2.9	3.1	0.3	1.9	3.2	0.8	1.7	2.2
United Kingdom	7.6	4.7	5.8	3.0	4.2	5.8	3.2	4.3	4.5
South Korea	8.1	2.5	2.7	1.9	4.7	2.6	2.1	5.2	7.2
Taiwan	4.8	0.8	-0.7	0.9	1.5	0.1	0.8	0.7	-1.8
Money supply (M1) growth: 3/									
United States	8.1	5.8	10.8	13.7	7.1	7.5	13.7	6.5	3.5
West Germany	5.2	3.0	5.7	10.7	9.6	2.5	11.3	8.2	9.3
Japan	6.2	5.1	6.2	11.7	7.7	6.6	8.0	9.4	8.6
U.S. Government finance: 4/									
Total receipts	5.5	11.7	9.7	4.6	8.7	11.5	4.8	9.2	9.7
Total outlays	11.9	6.7	11.3	5.4	2.5	8.5	6.7	2.2	4.2
Deficit	72.3	11.2	3.1	14.9	-10.8	6.6	12.7	-9.7	-24.2
Interest rates: 3/									
Eurocurrency 6-month interest rates (annualized value)--									
U.S. dollar	13.8	11.2	9.1	7.3	6.9	10.4	7.4	6.8	7.6
West German mark	8.9	6.1	5.7	4.7	4.3	6.0	4.8	4.2	4.0
Japanese yen	7.7	6.6	6.4	5.8	4.4	6.5	5.8	4.3	4.4
Discount rates--									
United States	11.1	8.7	7.9	6.8	5.6	8.4	6.8	5.5	5.9
West Germany	6.5	4.2	4.4	3.7	3.1	4.3	3.8	3.1	2.7
Japan	5.9	5.0	5.0	4.0	2.7	5.0	4.1	2.7	2.5
Money market rates--									
United States	13.0	10.2	8.4	7.2	6.5	9.5	7.2	6.5	6.9
West Germany	8.7	5.5	5.4	4.6	4.0	5.5	4.6	4.0	3.5
Japan	7.2	6.1	6.3	5.4	3.7	6.2	5.5	3.7	3.4
International prices and price indexes: 3/									
All primary commodities	-3.6	-6.8	-11.7	-4.6	19.2	-9.4	-4.8	17.3	26.0
Metals	-6.0	-11.0	-4.3	-3.2	28.5	-6.0	-5.0	25.5	49.5
Agricultural raw materials	-2.6	-1.6	-11.4	1.6	42.5	-7.3	4.1	40.8	15.4
Bulk food commodities	-3.7	-11.3	-15.8	-14.4	12.4	-13.2	-13.3	13.2	27.8
Gold	-11.4	-17.3	-0.4	18.6	19.3	-10.9	15.2	19.2	-1.6
United States--									
Import unit values	-1.0	2.1	-2.6	-3.6	9.5	-0.6	-1.3	10.7	5.0
Export unit values	3.0	0.3	-0.8	1.5	2.4	0.3	0.1	2.9	4.6
West Germany--									
Import unit values 5/	-7.6	-5.5	8.4	9.9	12.5	5.1	-14.2	-1.7	10.4
Export unit values 5/	-8.3	-6.4	12.4	24.7	13.0	5.4	-2.4	-1.4	9.7
Japan--									
Import unit values 6/	-4.0	-3.0	-2.2	-19.9	19.6	-1.7	-41.0	-10.8	-2.7
Export unit values 6/	-2.5	-2.4	5.3	18.0	8.8	0.6	-13.5	-3.1	-1.0
Superphosphates	-7.0	1.4	-3.0	-13.3	29.9	-5.7	0.1	36.7	-7.4
Wheat (U.S. Gulf ports)	-5.0	-0.3	-15.7	-19.8	8.8	-8.1	-14.3	7.7	25.6
Soybeans (Rotterdam)	1.0	-20.5	-17.0	-4.8	10.8	-18.4	-9.1	13.3	39.7
Soybean oil (Dutch ports)	4.0	12.9	-30.5	-42.0	12.9	0.5	-42.7	15.7	43.9
Soybean meal (Rotterdam)	-1.3	-39.2	-5.0	12.7	17.9	-30.8	15.0	17.0	34.6
Corn (Chicago)	3.2	-11.8	-19.3	-33.0	5.8	-12.8	-33.3	12.4	38.2

1/ Agricultural Outlook. 2/ Averages of daily exchange rates from The Wall Street Journal. 3/ International Financial Statistics. 4/ Survey of Current Business. 5/ Expressed in marks. 6/ Expressed in yen.

The failure of the “automatic” exchange rate system to produce the desired changes in a timely fashion left the G-7 with difficult choices. The slow adjustment in the U.S. current account deficit once again raised the specter of trade protection. A different policy mix was required. Further, if imbalances were to be corrected, cooperation was necessary; one nation’s policy could not undermine another’s. The Plaza agreement led to joint action to reduce the value of the dollar. The broader Louvre accord, in addition to seeking stable currency values, would fashion a system for more formal international cooperation and coordination.

The Meaning of Coordination

All G-7 countries were to be a part of the coordination/adjustment process. There was also an understanding that the newly industrialized countries of South Korea and Taiwan would have a role. Since they both had strong trade surpluses, revaluation of their currencies should be sought. However, the United States, Japan, and West Germany were the actors who would matter most. Realignment and stabilization of the dollar was at the core of the process, which implied fairly clear fiscal and monetary actions among individual countries. However, the specifics of the policies were explicit in neither the Plaza nor the Louvre accord.

The Plaza focus on exchange rates acknowledges the difficulty of agreeing to specific fiscal and/or monetary actions among individual countries. Often, political and domestic economic considerations are difficult to overcome. The United States, for example, as a deficit country, would have to adopt a more restrictive fiscal stance, the details of which would unquestionably raise considerable domestic outcry. Both West Germany and Japan would be required to implement policies carrying at least some risk of inflation, a severe political liability.

Such considerations led to one of the central parts of the coordination system: the development of a set of indicators that would act as signposts to a clearly defined destination of sustained, balanced, non-inflationary world growth at a substantially lower, stable dollar value. However, the paths that domestic policies could take were necessarily left obscure. Significantly, the indicator system would apply to both deficit and surplus countries. The system was formally announced at the Tokyo economic summit on May 6, 1986, and had GNP growth rates, inflation rates, interest rates, unemployment rates, fiscal deficit ratios, current account balances, monetary growth rates, reserves, and exchange rates as observable indicators. The indicator system was later broadened at the Louvre, for reasons explained below.

Between the Plaza and the Louvre: Exchange Rates as the First Order of Business

The Plaza agreement called for coordinated action on the part of the G-5 countries against what was routinely

described as an overvalued dollar. Intervention was the method for achieving this; individual country responsibilities were, however, left vague. The goals were first to bring down the dollar, and second, to convince currency traders that any contrary move would be strongly and uniformly resisted. Actors in foreign exchange markets would be convinced, it was hoped, and act on the belief that long dollar positions were losing strategies, and therefore reinforce any intervention.

Exchange rate manipulation by monetary authorities is not without risk, however, for domestic considerations of monetary policy must be held in abeyance. One way to exercise discretionary monetary policy is to intervene in foreign exchange markets. The easiest way of lowering the dollar is to make dollars more available by purchasing another currency. However, doing so raises the domestic money supply. Thus, a policy that concentrates, as required in the United States, on lowering the value of the dollar may increase inflation.

The G-5 countries had a very specific, though unwritten, target: the devaluation of the dollar by 10 to 12 percent (5, p. 17).^{1/} What they got was a good deal more (table 1). The dollar would eventually “realign,” declining by an average of over 21 percent between September 1985 and February 1987. During the same period, the dollar fell almost 30 percent against the yen and 28 percent against the mark.

Changes in monetary policy had a great deal to do with the depreciation. The annualized rate of growth in the U.S. money supply averaged almost 14 percent (on a 6-month moving average) between September 1985 and February 1987 (table 1). This contrasts sharply with the 6-percent growth of 1984 and 7.5 percent in the 21 months prior to the Plaza agreement. West Germany and Japan also pursued expansionary monetary policies, but with less vigor than the United States.

Fiscal policy in the United States, despite being slightly expansive, did not counteract the change in monetary policy. Total Federal Government outlays (table 1) increased at only a 6.7-percent annual rate between the Plaza and Louvre accords, based on 6-month moving averages, compared with 8.5 percent in the 21 months before. The smaller gain, however, led to an increase in the budget deficit of 12.7 percent.

The expansionary U.S. monetary policy produced a marked decline in interest rates on dollar deposits in Eurocurrency markets. Further, these declines were far larger than those on other currencies. The six-month London interbank offered rate (LIBOR) on dollars fell from 10.4 percent to an average 7.4 percent after the Plaza accord. The decline in

1/ Underlined numbers in parentheses refer to references at end.

U.S. rates also led other interest rates to fall: Euroyen 6-month rates fell from 5.0 to 4.1 percent, and those for marks declined from 4.3 to 3.8 percent. This fall in dollar returns raised the demand for marks and yen, and contributed significantly to the dollar's decline.

The biggest indicator in determining the success or failure of the Plaza agreement was exchange rates. The dollar fell against all major exchange rates except the Canadian dollar, and even depreciated against all major exchange rate indexes important to U.S. agriculture. U.S. interest rates were down and the fiscal expansion of the early 1980's was slowing. Unfortunately, the trade imbalances remained and, in fact, expanded.

The U.S. current account deficit ^{2/} increased (table 2) from an annualized quarterly average of \$97.3 billion in the seven quarters prior to the Plaza accord (the third quarter of 1985) to \$118.7 billion in the seven subsequent quarters. The West German current account surplus rose, during the same time, from \$20.6 billion (61.0 billion marks) to \$47.9 billion (105.1 billion marks). The Japanese surplus jumped from \$40.7 to \$80.1 billion (from 9.9 to 14.1 trillion yen).

Why Did Trade Imbalances Fail To Adjust?

The decline in the dollar was expected to affect trade imbalances by adjusting prices. World prices of traded commodities, expressed in dollars, were to have risen. The United States was supposed to lower its demand for imports and increase its exports. However, world dollar prices reacted sluggishly to the dollar's drop (table 1).

Price indexes for primary commodities, metals, ^{3/} and bulk food commodities all declined, on average, over the 19 months following the Plaza agreement. Further, of the 7 items shown, only gold and soybean meal show any definite rise over the same period. Average U.S. import prices (measured by import unit value) actually fell, on average, while export prices remained stagnant. Not surprisingly, U.S. residents received little incentive to sell abroad or reduce purchases from overseas. Part of the problem may have been inordinate attention to the price of gold, which gave the expected response (increasing by an average of 15.2 percent between the Plaza and Louvre accords), but was not an accurate indicator of general price changes.

Consumption in the United States (table 2) increased as a proportion of income while interest rates fell, adding to demand for imports. Japan actually saw a slowdown in domestic consumption, from a 4.9-percent annual rate of growth in the seven quarters prior to the Plaza meeting to 3.8 percent afterward. The result was an actual decline, on

average, in the dollar value of Japan's imports—exactly the reverse of the desired outcome. West Germany had a significant increase in the dollar value of its imports following the Plaza agreement, but it was overwhelmed by a rise in exports—again, the wrong result.

The Louvre Accord: Turning Around the Trade Imbalances

The Plaza-Louvre interregnum pointed to the need for Japan and Germany to raise domestic demand, and for the United States to lower demand. Statements of agreement, or communiques, acknowledged Japan's willingness to stimulate demand by enacting a special 6.0-trillion-yen budget, and lowering the discount rate by 0.5 percent. Germany would increase or accelerate certain tax cuts, totaling 14 billion marks over 5 years. The United States pledged to pursue the reduction of the Federal deficit to 3.9 percent of GNP in 1987 and 2.3 percent by 1988, and to adhere to the Gramm-Rudman-Hollings process. But beyond these proposals, few specifics were spelled out. Considerable discretion on the timing and mix of monetary and fiscal policies was allowed.

Total domestic consumption in the United States (table 2) has slowed since the Plaza agreement, and has risen in West Germany and Japan. Growth in government consumption has been faster than overall economic growth in West Germany, but slower in Japan.

The U.S. current account deficit apparently turned around in the last quarter of 1987 and the first quarter of 1988. The dollar value of the current account surpluses of West Germany and Japan also narrowed substantially in the initial quarter of 1988. Ever since the Louvre accord, however, the dollar values of the current account surpluses in both Germany and Japan have widened. The domestic currency valuation shows little change for West Germany, but a significant decline for Japan.

The policy coordination process must be viewed as a success to date, based on exchange rates, and recently, changes in current account imbalances. However, the shift has been achieved largely without difficult or costly domestic decisions. Inflationary pressures in Japan and West Germany have been held in abeyance. The rise in domestic demand in both countries has reduced the necessity for expansionary (and risky) fiscal policies, which could raise interest rates and shorten the recovery, especially in West Germany. The reduction in the U.S. budget deficit between 1986 and 1988 has come without actual (nominal) cuts in popular spending programs or overt Federal tax increases.

Volatility

Having realigned the dollar, the G-7 countries would also have to stabilize its value. This was a chief objective of the

^{2/} Excluding transfers.

^{3/} Does not include gold.

Table 2--Selected aggregate policy measures

Item	1981	1982	1983	1984	1985	1986	1987	1984-I through 1985-III	1985-III through 1987-I	1987-I through 1988-I
Total trade: 1/	Annualized averages of quarterly percentage changes									
United States--										
Merchandise exports	5.8	-11.0	-4.0	9.0	-1.8	3.8	11.4	4.8	1.6	15.4
Merchandise imports	6.3	-6.5	8.7	24.2	1.7	9.1	11.1	14.1	7.0	11.9
Current account deficit										
Billion dollars	-14.5	-0.4	36.7	94.8	101.4	123.5	140.5	97.3	118.7	138.0
West Germany--										
Merchandise exports	-8.9	-0.2	-3.6	1.0	7.7	33.5	20.5	1.8	27.9	18.3
Merchandise imports	-13.6	-6.3	-1.8	0.6	4.7	21.2	18.9	0.2	18.9	18.0
Current account deficit										
Billion dollars	-7.7	-15.8	-15.5	-20.3	-27.0	-52.4	-61.3	-20.6	-47.9	-59.0
Billion marks	-17.3	-38.4	-39.4	-58.6	-77.1	-112.5	-109.4	-61.0	-105.1	-104.4
Japan--										
Merchandise exports	18.9	-7.7	5.8	15.8	3.2	18.4	9.4	9.4	14.2	11.0
Merchandise imports	4.1	-7.6	-4.5	9.2	-4.9	-4.3	14.7	2.2	-4.9	20.1
Current account deficit										
Billion dollars	-6.6	-8.3	-22.6	-36.6	-51.1	-88.2	-90.8	-40.7	-80.1	-88.3
Trillion yen	-1.5	-2.1	-5.4	-8.7	-12.0	-14.6	-13.1	-9.9	-14.1	-12.5
Total domestic consumption: 1/	Annualized averages of quarterly percentage changes									
United States	10.6	7.1	7.8	9.6	7.3	7.7	6.9	8.6	7.4	7.1
West Germany	5.6	3.4	5.0	4.1	3.7	3.8	3.6	3.8	3.8	4.0
Japan	5.7	6.8	5.2	4.9	4.8	3.3	4.3	4.9	3.8	4.5
Government expenditure: 1/										
United States	10.9	9.1	5.3	9.1	10.7	6.7	6.1	9.7	7.9	6.0
West Germany	6.9	2.5	3.1	4.2	4.3	4.5	3.8	4.4	4.4	3.9
Japan	8.8	5.2	4.4	5.1	4.4	6.1	1.8	4.8	5.1	1.8
Central government deficit: 2/	Percent of Gross Domestic Product									
United States	2.4	4.1	5.6	5.1	5.3	4.8	3.3	5.2	4.7	3.3
West Germany	2.5	2.4	1.9	1.6	1.3	1.2	1.4	1.5	1.3	1.5
Japan	5.9	5.9	5.6	4.7	3.9	3.6	3.3	4.4	3.6	3.1

1/ International Financial Statistics. 2/ World Economic Outlook.

Louvre meeting. The accord itself states, "Further substantial exchange rate shifts . . . could damage growth and adjustment prospects...therefore, they agree to cooperate closely to foster stability of exchange rates around current levels."

What was not spelled out was that "reference ranges" of 2.5 percent and 5.0 percent were set up around specified exchange levels. The 2.5-percent level was a voluntary line of defense. At a deviation of 5.0 percent from "par," consultation on policy adjustments was required, and intervention efforts were expected to be intensified (5, p. 186).

One way to measure the volatility of changes in exchange rates and interest rates is via the coefficient of variation, the standard deviation divided by the mean, expressed in percentage terms. Table 3 shows the moving average of daily coefficients of variation over 60-day intervals for critical time periods. The higher the value, the greater the variation.

The periods before and after September 22, 1985 yield some interesting results. The value of the dollar changed by a greater amount, on a day-to-day basis against the German mark and Japanese yen, after the Plaza agreement than before. This is consistent with a persistent, sharp decline in the value of the dollar. Conversely, interest rates on dollar deposits in Europe were less variable. The implication is that, following the Plaza agreement, interest rates were targeted, and exchange rates were allowed (expected) to adjust accordingly. Furthermore, other currencies were less vari-

able against the dollar after September 22 than before. The burden of adjustment, and variability, was on the yen and the mark.

The Louvre accord was apparently followed in general until Black Monday, October 19, 1987, the first and only worldwide stock market crash. Until Black Monday, most exchange rates showed less day-to-day variation than before the Louvre accord; exchange rates were being stabilized.

Black Monday upset the coordinated agenda, however, and volatility returned. The United States, in particular, seemed to suspend its participation in the coordination process, choosing to supply liquidity to domestic markets and lower interest rates. At that point, fear of domestic deflation took precedence over fear of further, possibly severe, dollar devaluation. As a result, the 6 months following October 19, 1987 had greater variability for all major currencies against the dollar, save the Canadian dollar and Taiwan new dollar. The 6 months prior to September 30, 1988 produced a return to relative stability, however.

The shock of the stock market drop is best evidenced if one views the combined variability of forward exchange rates ^{4/} and interest rates (table 3). Normally, the percentage difference between the spot and forward exchange rate equals the difference in nominal rates of return between

^{4/} The price of foreign exchange to be delivered at a specified time in the future.

Table 3--Selected daily exchange rate and interest rate variability

Item	Jan. 1, 1984: through Sept. 22, 1985	6 months prior to Sept 22, 1985	6 months subsequent to Sept 22, 1985	6 months prior to Feb. 22, 1987	6 months subsequent to Feb. 22, 1987	6 months prior to Oct. 19, 1987	6 months subsequent to Oct. 19, 1987	Oct. 19, 1987:March 30, 1988 through Sept. 30, 1988	March 30, 1988 through Sept. 30, 1988
Spot exchange rates:									
British pound	3.09	4.28	2.18	1.94	1.68	2.02	2.70	2.59	2.48
Canadian dollar	0.86	0.94	0.74	0.62	0.45	0.91	0.89	0.91	0.96
French franc	2.63	3.16	3.14	2.54	1.92	1.47	2.22	2.15	1.95
Italian lira	2.39	2.70	3.01	2.59	2.04	1.49	2.20	2.12	1.92
Japanese yen	1.55	1.56	3.91	3.16	2.13	2.57	2.68	2.24	1.72
South Korean won	0.73	0.78	0.33	0.42	0.67	0.71	0.82	0.85	0.98
Swiss franc	2.88	3.74	3.04	2.91	2.59	1.99	2.94	2.66	2.24
Taiwan new dollar	0.44	0.48	0.44	0.70	1.04	1.91	0.95	0.59	0.19
West German mark	2.67	3.14	3.24	2.81	2.39	1.63	2.51	2.33	2.02
London interest rate on									
U.S. dollars:									
3-month	4.44	4.30	1.44	2.92	3.50	3.27	4.38	4.02	3.53
6-month	4.69	4.94	1.76	2.97	3.19	3.84	4.04	3.88	3.61
1-year	5.89	5.34	2.32	3.37	3.34	4.85	3.91	3.85	3.74
Forward exchange rates:									
Canadian dollar--									
30-day	0.87	0.95	0.76	0.66	0.51	0.90	0.80	0.90	1.06
90-day	0.90	0.99	0.80	0.74	0.62	0.93	0.80	0.90	1.05
180-day	0.94	1.06	0.86	0.87	0.86	1.00	0.83	0.91	1.05
West German mark--									
30-day	2.68	3.15	3.25	2.82	2.39	1.64	2.59	2.37	2.05
90-day	2.71	3.17	3.24	2.81	2.39	1.68	2.61	2.40	2.06
180-day	2.75	3.17	3.23	2.80	2.40	1.76	2.66	2.44	2.10
British pound--									
30-day	3.12	4.30	2.18	1.95	1.70	2.05	2.69	2.56	2.39
90-day	3.21	4.45	2.21	1.99	1.76	2.12	2.74	2.61	2.44
180-day	3.37	4.74	2.25	2.06	1.85	2.24	2.79	2.69	2.54
Japanese yen--									
30-day	1.55	1.55	3.91	3.16	2.12	2.57	2.66	2.21	1.68
90-day	1.56	1.56	3.90	3.15	2.11	2.62	2.72	2.25	1.68
180-day	1.54	1.52	3.87	3.15	2.13	2.71	2.77	2.34	1.84
Combined forward and interest rate variability:									
Canadian dollar--									
90-day	4.26	4.01	1.95	4.00	5.11	3.45	6.95	5.56	4.62
180-day	4.67	4.81	2.95	5.70	8.31	4.96	7.37	5.71	4.40
West German mark--									
90-day	4.40	3.85	1.73	3.77	3.75	3.27	21.44	14.15	7.81
180-day	5.56	5.16	3.40	4.79	6.62	4.79	24.53	16.41	9.36
British pound--									
90-day	4.09	3.72	1.91	2.95	3.04	2.38	17.16	11.65	6.88
180-day	4.10	3.50	2.33	3.12	3.00	2.77	15.39	11.03	7.30
Japanese yen--									
90-day	3.98	3.62	2.24	3.20	3.25	3.83	17.56	11.70	6.05
180-day	3.73	4.06	4.10	4.36	4.38	4.60	20.64	15.46	11.27

Note: Coefficient of variation of daily nominal value around 60-day moving average, average over period. All data are from the The Wall Street Journal.

similar financial instruments denominated in two currencies.

5/ Thus, when one of the interest rates, say on German marks, is more stable than the comparable U.S. rate, one would expect the combined coefficient of variation to approximate that of the U.S. interest rate. Until October 19, 1987, this was true. However, the drop led to uncertainty, reflected in the sharp increase in coefficients of variation for the "combined" values shown in table 3. Few people were willing to go out on a forward limb, meaning thin markets and large variation.

Policy changes as a result of Black Monday have been seen only in West German monetary policy, which has been very expansionary. U.S. monetary policy, on the other hand, has been slightly contractionary in 1988 to date. The fears of an overheated economy have led to an anti-inflation effort, and the dollar appreciated slightly into September, within the reference ranges set in the Louvre accord. Thus, the Louvre agreement still seems to be holding.

5/ Computed as the current interest rate on U.S. dollar deposits in London, less the percentage change implied by the forward over the spot rate. This would, normally, yield the foreign interest rate under the covered interest parity condition. Suppose, for example, the current spot rate for yen is 125 per dollar, and the 180-day forward rate is 122.5. This implies a yen appreciation of 2 percent over 6 months, or 4 percent per year, approximately. Thus, if U.S. interest rates are 8 percent, we would expect Japanese interest rates to be 4 percent.

Conclusions

Policy coordination is no longer just a theory, if results are any indication. The U.S. budget and trade deficits have shrunk, reducing the need to import capital. This frees international capital and means that lending to debtor nations can accelerate. The dollar has been brought down, and is more stable (Black Monday aside) relative to major currencies. The shock of Black Monday did not result in any longstanding abandonment of coordination.

One might argue that the success, to date, of international coordination efforts bodes well for reform of world agricultural policies. First, the stabilization of exchange rates around narrow bands removes some of the necessity for implementation of buffer policies, such as variable levies or export subsidies (6). Second, the cooperative effort emphasizes the interdependence of the world economy as a whole, with ramifications for agriculture. Third, the focus on indicators provides an objective basis for determining success or failure.

However, the Federal Reserve's reaction in apparently moving from fighting the dollar to battling inflation points to the central problem of coordination: domestic considerations may well force at least occasional compromise between internal and external objectives.

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NEW TECHNOLOGY SHIFTS THIRD WORLD GRAIN AND SOYBEAN TRADE

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Abstract: Raising crop and livestock productivity through technological advances is inevitable as Third World countries develop. Because climate is important in crop selection and input use, the impact of technological advances on trade patterns will not be the same everywhere. New crop technologies suitable for one agro-environment are often not suitable for others, and are irrelevant where the crop is not grown. Key to improving livestock productivity has been the transfer of intensive livestock production technology from the developed countries. This technology is easier to transfer than crop varieties because it is not linked closely to climate.

Keywords: Agricultural technology, agricultural trade, developing countries, U.S. agricultural exports.

Improved crop varieties provide the rising productivity needed for economic growth in many Third World countries. The increased output can also affect trade. Imports of some commodities will decline as countries raise yields and output of those crops which they are well suited to grow, for example, wheat in India and rice in Indonesia (table 1a). If production exceeds domestic needs, the surplus will be exported, as with soybeans in Brazil and Argentina (table 1b).

However, import markets do not always disappear, and new import markets have opened as rising income from economic growth creates a demand for commodities not well

suited for local production. Rising wheat imports in tropical countries are a good example. Wheat imports by developing countries have grown 100 percent since the early 1960's, even though wheat output in the developing world has risen more than 150 percent.

Economic growth also promotes the use of improved technology. The higher incomes that come with economic growth shift diets, creating demands for new products. In particular, the shift to more animal products in diets has prompted a rapid expansion of intensive livestock production in higher income Third World countries. This growth

Table 1--The impact of technology transfer on trade, selected periods

a) Food grains	India and Indonesia are outstanding examples of the use of improved varieties to achieve a national goal of self-sufficiency for particular grains. Part of the imports by these countries at their peak were subsidized by foreign governments, including the United States. Both countries are expected to fluctuate around self-sufficiency. Presently, they are net importers.	
India, wheat:		
Trade volume (1,000 MT)	Imported 7,193 in 1965-67	Exported 78.9 in 1984-86
Percent of wheat area planted to improved varieties	Negligible in 1965-67 (4)	76 in 1983-84 (4)
Indonesia, rice:		
Trade volume (1,000 MT)	Imported 1,916 in 1977-79	Exported 54 in 1984-86
Percent of rice area planted to improved varieties	59 in 1977-78 (3)	82 in 1983-84 (3)
b) Soybeans	Brazil and Argentina captured a large share of world soybean and soybean products trade from the United States following the transfer of both soybean varieties and processing technology.	
Percent of world exports:		
United States	78 in 1965-67	53 in 1983-84
Brazil and Argentina	2 in 1965-67	32 in 1983-84
Harvested area (1,000 ha):		
United States	13,731 in 1965-67	26,720 in 1983-85
Brazil and Argentina	528 in 1965-67	12,057 in 1983-85
c) Feed grains	The expansion of livestock feeding in higher-income developing countries has been facilitated by the transfer of modern livestock technology from developed countries. These countries have shifted from being net exporters to net importers of feed grains.	
Higher income countries: 1/		
Trade volume (1,000 MT)	Exported 7,461 in 1965-67	Imported 5,793 in 1985-85
Per capita feed use of coarse grains (kg)	49.5 in 1965-67	90.7 in 1985-85
Lower income countries: 1/		
Trade volume (1,000 MT)	Imported 386 in 1965-67	Imported 4,732 in 1983-85
Per capita feed use of coarse grains (kg)	2.4 in 1965-67	10.6 in 1983-85
Note: Figures are averages for years cited. 1/ The lower-income developing countries include 2 billion people with per capita incomes ranging from \$100 to \$1,700 (excludes the People's Republic of China). The higher-income developing countries include .5 billion people with per capita incomes greater than \$1,700.		

has been facilitated by the transfer of modern technology from developed countries. The feed needs of these livestock industries have frequently outpaced domestic production, creating growing import markets (table 1c).

New Varieties Make Higher Fertilizer Use Worthwhile

New crop varieties are helping transform subsistence agriculture, where native varieties' yields are limited by poor response to fertilizers. Plant breeders have been quite successful in developing varieties that give higher yields with fertilization. However, these new varieties are not always widely adopted.

If it is not economically practical to apply the fertilizers needed to exploit the genetic potential of improved varieties, farmers are reluctant to shift away from their tried and proven traditional varieties. In particular, improved varieties have not spread widely into rainfed areas, where the lack of reliable water makes the use of additional and required inputs risky. The spread of improved varieties in many low-in-

come countries has also been slowed by inadequate capacity for producing, storing, and distributing seed to farmers.

About 80 percent of the Third World's cultivated land is in rainfed agriculture, with very low input use. FAO (the Food and Agriculture Organization of the United Nations) estimates that, on average, only 3 kilograms of fertilizer are applied per hectare in the low-rainfall areas, while the higher rainfall areas average 20 kilograms per hectare (5)^{1/}. In contrast, about 110 kilograms per hectare are applied in areas with reliable irrigation.

Irrigation has been especially important in Asia, which has almost two-thirds of the irrigated area of the developing world (5). The Near East has 20 percent. Latin America has 13 percent, while all of Africa has only 3 percent. Climatological and geological difficulties in large parts of Africa limit irrigation potential.

1/ Underlined numbers in parentheses refer to references at end.

Table 2--Estimated area planted to high-yielding varieties (HYV's) of wheat and rice in developing countries, 1982-83

Region	Wheat		Rice	
	Area of HYV's	Percent of total wheat area	Area of HYV's	Percent of total rice area
	1,000 ha	Percent	1,000 ha	Percent
Asia	25,400	79.2	36,400	44.9
Near East	7,600	30.6	100	8.4
Africa	500	50.6	200	4.7
Latin America	8,300	77.6	2,500	32.9
Total	41,800	60.9	39,200	41.6

Source: (3, 4).

Improved Wheat and Rice Varieties

Over the past 25 years wheat yields have increased more than rice yields (figure 1), in part because the use of improved wheat varieties is more widespread (table 2).

The impact of these improved varieties on trade was particularly striking in India and Indonesia, which were once the Third World's largest importers of wheat and rice, respectively. Both countries promoted these varieties with subsidized inputs and high support prices as part of their national food security programs (13). They achieved self-sufficiency in just a few years. As these countries reduced their imports, governments reduced incentives for wheat and rice production so as to avoid producing surpluses of subsidized grain that would have to be exported at a loss. These countries are expected to fluctuate around self-sufficiency in these grains depending on weather and changing government policies. Both countries have recently imported grain.^{2/}

For developing countries as a group, however, self-sufficiency in wheat and rice has been declining. The ending of imports by a few Third World countries has been more than offset by the growth of new markets in other Third World countries, especially for wheat, because unlike rice, it is not a suitable crop in both tropical and temperate climates (12).

Sometimes opposing trends can be seen in one country. For example, improved varieties allowed Indonesia to achieve self-sufficiency in rice. But rising incomes and increasing urbanization led to a greater demand for wheat, which could only be met by imports because Indonesia's climate is not suited for wheat production. Indonesia's annual imports of wheat and wheat products have risen from 20,000 tons in the mid-1960's to 1.6 million tons in 1987/88.

High-yielding wheat varieties have spread to about 60 percent of the wheat area in the Third World (table 2). This includes most of the irrigated area. The rate of acreage expansion jumped slightly in the late 1960's as the high-

yielding semidwarf varieties made it profitable to switch land to wheat. The area planted to wheat has continued to expand, but not at the same rate as yields. Average yields are roughly 130 percent higher under irrigation than under rainfed production (1).

About 40 percent of the rice area in the developing countries is in high-yielding varieties (table 2). When improved varieties are planted on irrigated land and fertilized, yields increase sharply. These improved varieties have also boosted multiple cropping in irrigated areas because they generally have a shorter growing season and their growth and maturity are not controlled by daylength. These technological advances had a dramatic impact in Asia, where most rice (91.5 percent) is irrigated. In contrast, 50 percent of the rice in Africa is upland, while in Latin America 74.4 percent is upland (6).

Yields of upland rice are lower because of erratic rainfall, poor weed control under nonflooded conditions, and low fertilizer use. Under these conditions, improved varieties have failed to demonstrate a clear advantage (see box). Average irrigated rice yields are roughly 150 percent higher than upland, rainfed rice yields (6). For some rainfed areas, corn and particularly sorghum may be a better choice for farmers because of more drought tolerance.

Corn and Sorghum Are Important Rainfed Grain Crops

Both corn and sorghum are important rainfed crops in the Third World (2, 10). Corn yields under favorable conditions will exceed sorghum. Corn, however, is at higher risk in the drier areas and during the dry season. Sorghum can usually produce some grain, even under low rainfall.

Corn and sorghum growers face the same situation as wheat and rice producers. To get higher yields, soil fertility must be improved with fertilizers. However, heavy fertilizer use where rainfall is not assured is not as economically practical as under irrigation.

Sorghum production has lagged corn slightly because its area has expanded less (figure 2). The overall rate of improvement in yields has been about equal since the 1960's, but the trend differs. Sorghum yields jumped sharply in the early 1970's when hybrid varieties were introduced in Mexico, Argentina, and India. Corn yields have steadily increased since the early 1960's in Latin America and Asia.

About half of the corn area in developing countries is now planted to improved varieties (2) (table 3). The improved varieties were developed through breeding programs in each country. Although corn can be grown under a wide range of environments from the tropics to temperate-climate countries, when varieties are transferred from one environ-

^{2/} It is important to remember that just because a country has eliminated its food imports does not mean that none of its people are hungry. India, for example, still has millions of undernourished people, and the potential demand far exceeds current production. Given a higher annual income than at present (\$270 per person), India's trade position could change drastically.

Where Technology Lags: The Case Of Upland Rice

Plant breeders have not been able to achieve yield gains with upland rice similar to those achieved with irrigated rice.

^{1/} This may not be due to the characteristics of the rice plant, which grows under a tremendously wide range of climatic and soil conditions around the world. The term upland rice itself testifies to the importance of the environment for results in cultivating this plant. The problems of drought stress, disease, and nutrient uptake on the generally poorer soils of rainfed areas in Asia, Africa, and Latin America have been difficult to solve.

Under conditions like these, improved varieties have not demonstrated to farmers a significant advantage over traditional, unimproved varieties, and thus have not found wide adoption. Table 1 shows yields reported by French agronomists in trials comparing three improved rice varieties with a traditional variety grown under identical conditions in northeast Brazil. The traditional variety clearly held its own with the improved varieties when no fertilizer was used, which corresponds most closely to local farmers' practices. Even with fertilizer application, the improved varieties achieved rather modest yield advantages by Green Revolution standards over the traditional variety. The advantage ranged from 4.9 percent to 41.8 percent, with averages for the three improved varieties of 23.2, 14.3, and 24.1 percent, respectively. In comparison, yield advantages of high-yielding varieties of rice over traditional varieties recorded at 28 irrigated-rice growing locations in Asia in 1968-77 ranged from 10 to 100 percent, and averaged 40 percent (1, p. 28).

Recalling that the comparisons in table 1 are experiment station results, benefiting from optimal treatments, it is not difficult to see why the improved varieties have not been particularly attractive to the small farmers of this Brazilian subsistence farming region who have to face the physical and economic risks involved in cultivating fields cleared from the forest.

Rice yields are lower in aerobic (oxygen present) soils than in anaerobic (oxygen absent) soils. The maintenance of fertility under aerobic soil conditions such as are experienced in upland rice cultivation poses entirely different problems of plant nutrition than those associated with anaerobic soil conditions of irrigated rice cultivation. Under aerobic conditions, organic matter is rapidly mineralized, nitrogen losses increased, and phosphorus rendered unavailable to the plant. Problems of iron deficiency and manganese and aluminum toxicity are common.

Competition from weeds is an important limiting factor in upland rice cultivation. This is not present in irrigated cultivation, since standing water prevents weed growth. Upland rice also is subject to many of the same diseases and pests that attack irrigated rice.

Nevertheless, the widespread practice of upland rice cultivation attests to the fact that it makes economic sense despite its yield disadvantage in many parts of the world. Some of the desirable features of upland rice cultivation are these:

- Upland rice cultivation does not require the farmer to bear the high cost of irrigation.

^{1/} Upland rice refers to rice cultivation other than swamp or irrigated systems in which the crop is planted, or transplanted, and maintained until approaching harvest in water.

Table 1--Rice yields, Bacabal Experiment Station, Maranhao, Northeast Brazil, 1979 and 1980

Variety	First year rice on newly cleared land	In rotation following--				5-trial average	
		Rice	Maize	Peanuts	Cassava		
Kg/ha							
Without fertilizer:							
Improved varieties:							
IRAT 10	1,924 (-4.9)	2,788 (11.8)	2,144 (-6.8)	2,413 (-6.6)	1,981 (4.9)	2,250 (-0.3)	
IRAT 79	1,883 (-6.9)	2,615 (4.9)	2,043 (-11.2)	2,652 (2.7)	1,781 (-5.7)	2,195 (-3.2)	
IRAT 101	2,103 (3.9)	2,636 (5.7)	2,464 (7.1)	2,778 (7.5)	1,856 (-1.7)	2,367 (4.5)	
Traditional variety: Cana Roxa	2,023	2,493	2,300	2,583	1,888	2,257	
With fertilizer:							
Improved varieties:							
IRAT 10	4,002 (41.8)	4,931 (25.5)	4,232 (5.5)	4,554 (15.1)	4,879 (28.0)	4,520 (23.2)	
IRAT 79	3,502 (24.0)	4,383 (11.5)	4,205 (4.9)	4,444 (12.3)	4,523 (18.6)	4,211 (14.3)	
IRAT 101	3,744 (32.6)	5,209 (32.5)	4,524 (12.8)	4,646 (17.4)	4,777 (25.3)	4,580 (24.1)	
Traditional variety: Cana Roxa	2,823	3,930	4,010	3,957	3,812	3,706	

Notes: Yields are averages of trials. Figures in parentheses show yield advantage of improved variety over traditional variety as a percentage.

Source: Compiled from (3), table 3, p. 241.

- Puddling the soil is unnecessary in upland rice cultivation. Therefore, soil structure is not impaired, and is in a suitable condition for cultivation of other crops in rotation with rice.
- Lodging is less of a problem with upland rice cultivation, and if it occurs the loss is less since the grain will not be spoiled by immersion under water.

The fact that plant scientists have not achieved yield breakthroughs in upland rice comparable to those of the Green Revolution in irrigated rice has important consequences for world food production because of the large area occupied by upland rice cultivation. Low growth rates in yields of upland rice hold down growth rates of rice production as a whole (table 2).

Moreover, the upland rice producing areas of the world are associated with the rural poor in many countries—north-east Brazil; Guinea, Sierra Leone, and Liberia in West Africa; northeast Thailand; and West Bengal and Orissa in

India, for example. These regions, by and large, sustain relatively high population densities. Farmers in these regions cultivate export crops like cassava in northeast Thailand, rubber in Liberia, and jute in West Bengal. Some of these crops are quite labor-intensive.

There are ways plant scientists can improve the productivity of upland rice cultivation, and with it the income-earning ability of the farmers who depend on it for their livelihood. But these probably lie in building in greater flexibility (e.g. shorter growing seasons) in rice varieties so farmers can fit them into intensified multiple-cropping systems involving other crops, rather than in concentrating on the development of high-yielding varieties. [Arthur J. Dommen (202) 786-1884]

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Table 2--Adoption of high-yielding varieties (HYV) of rice, West Bengal, India, 1965-66 to 1984-85

Crop	Type of cultivation	Percent of gross rice area, 1984-85	Percent of crop under HYV, 1984-85	Average yield	
				1965-66	1984-85
-----Percent-----				-----Kg/ha-----	
Aman	Upland	80	22	1,087	1,504
Aus	Upland	14	33	802	1,046
Boro	Irrigated	6	100	1,226	2,699
Total		100		1,052	1,557

Source: Compiled from (2).

Table 3--Estimated area planted to improved corn varieties in developing countries, 1985-86

	Area planted to improved corn as a percent of total corn area		Area planted to improved corn varieties
	Percent		1,000 ha
Eastern and Southern Africa	36		3,330.7
West Africa	22		1,238.6
North Africa	49		594.4
Middle East	44		510.0
South Asia	34		2,547.6
Southeast Asia and the Pacific	37		3,018.5
Mexico, Central America, and Caribbean	42		4,285.7
Andean region	29		510.7
Southern cone of South America	76		11,624.2
Total	46		27,633.4

Source: (2).

ment to another performance falls greatly. High-yielding U.S. corn hybrids are not transferable to the Third World.

The United States and other countries have raised corn yields sharply with hybrids. The use of hybrids, however, is

limited in many developing countries which lack a seed industry capable of supplying the needed seed each year. The extra expense to farmers for the higher priced hybrid seed also slows its adoption.

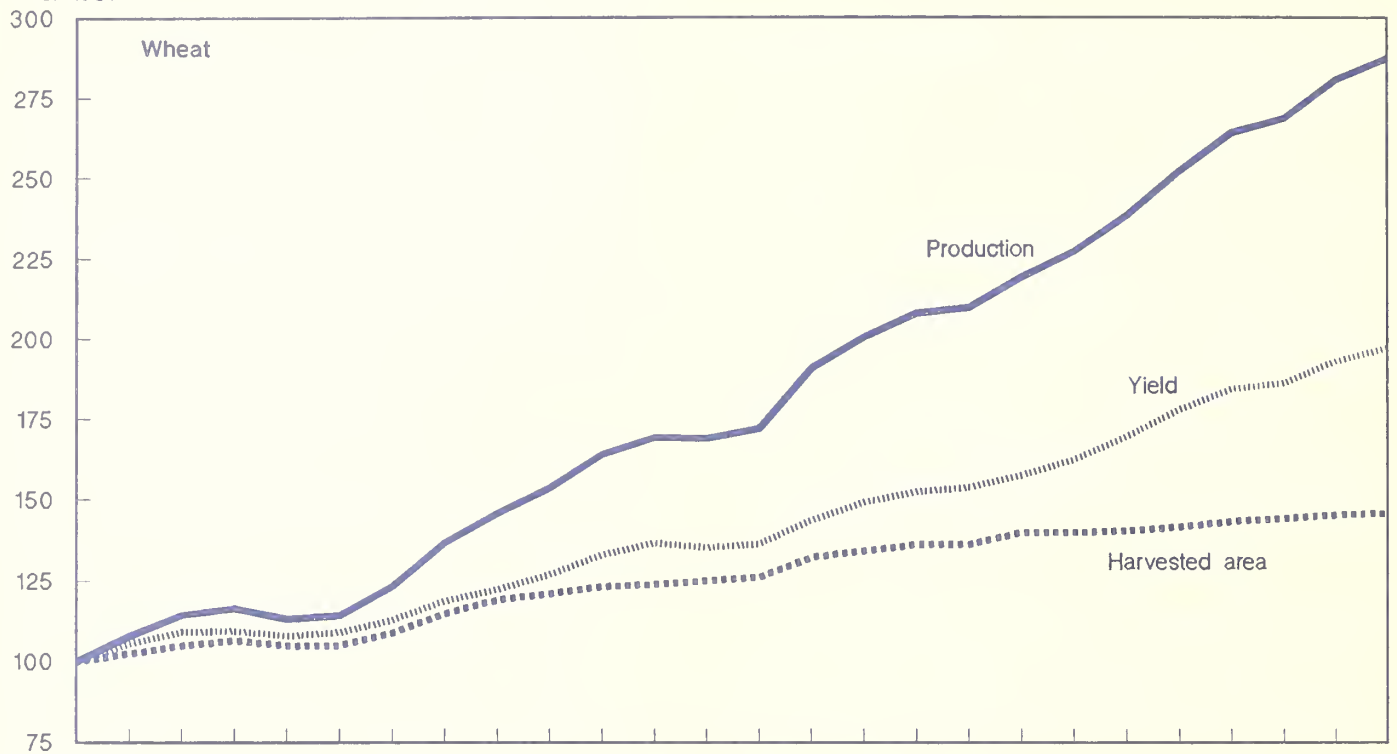
U.S. sorghum varieties were transferable to the few Third World countries which have similar production conditions and use the grain to feed livestock. Sorghum has been greatly changed by U.S. researchers since it was introduced in the United States in the 1850's. The tall, late-maturing, daylength-sensitive varieties from Africa were transformed into short, early-maturing plants insensitive to daylength. Shortening the plants permitted mechanized harvesting. Daylength insensitivity increased the crop's range of adaptability.

In the 1950's commercial hybrid sorghums were developed by U.S. researchers. Because sorghum is a self-pollinating crop, producing hybrid sorghum on a commercial scale was not possible until the discovery of cytoplasmic male sterility (CMS) in the early 1950's. Self-pollination can be prevented by CMS, a factor inherited through the

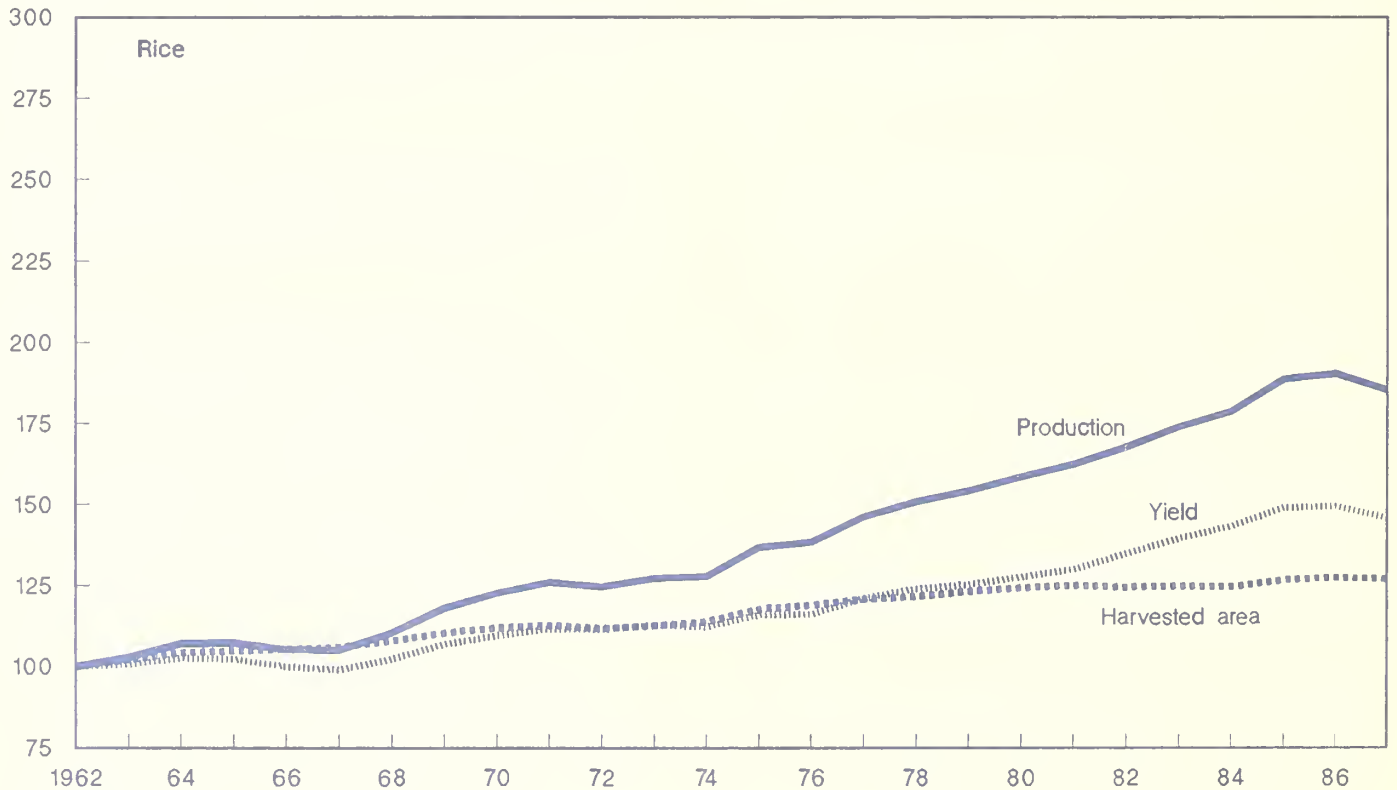
Figure 1

Third World Wheat Production Growing Faster than Rice Production

% of 1961

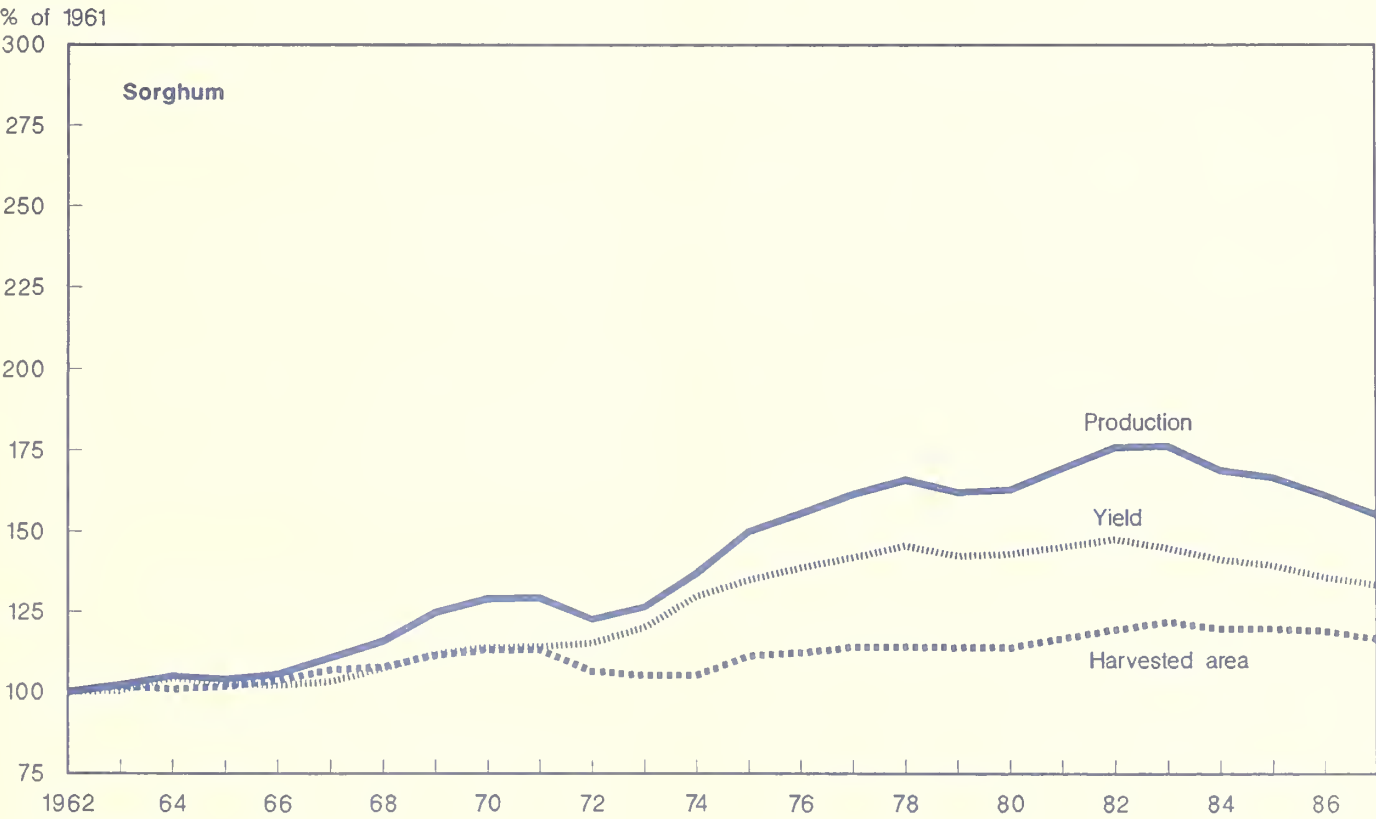
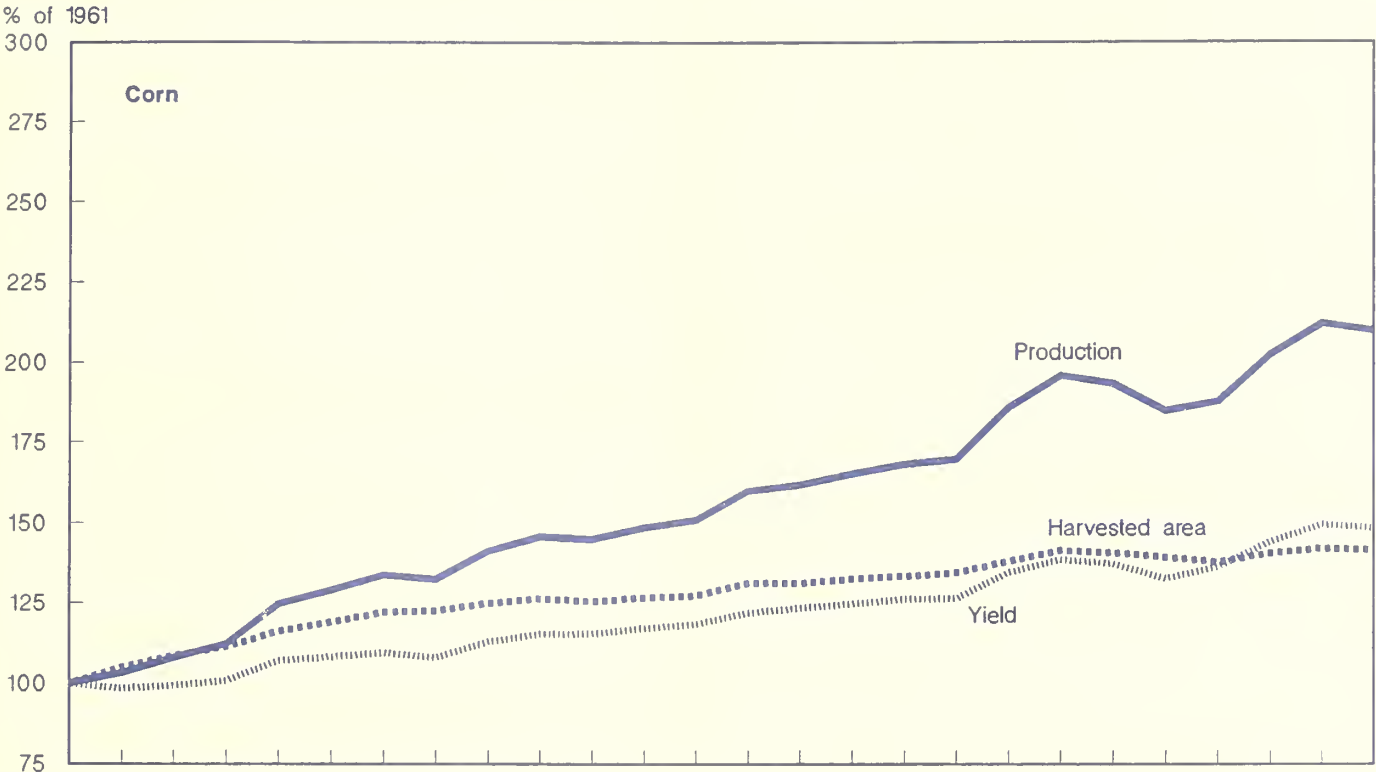


% of 1961



3-year averages.

Figure 2
Third World Corn Output Continues Expanding While Sorghum Stagnates



3-year averages.

cytoplasm that prevents viable pollen from being produced. The introduction of hybrid sorghum in the United States during the late 1950's increased sorghum yields similarly to those for hybrid corn.

When yield trials showed that U.S. sorghum hybrids performed well in Mexico and Argentina, U.S. seed companies were quick to market them. Sorghum output increased rapidly in Mexico, but lagged the growth of the livestock industry. The country remains a large importer of sorghum to feed livestock.

In Argentina, sorghum output exceeds domestic needs, and the surplus is exported. Crops that grow well in the United States also grow well in Argentina. Because the country is sparsely populated, there will likely be continued surpluses for export. This has long been the case for cereal grains, and is now true for soybeans as well.

Production of Soybeans for Export Increases Rapidly

While soybeans are a traditional food crop in the Far East, they are a relatively new crop elsewhere. Soybean production expanded first in the upper Midwest of the United States, then in the southern United States, and now in South America (11).

East Asian soybean varieties grew well in the upper Midwest because of similar temperate climate and daylength. But there were problems. Asian farmers had developed varieties that shattered easily, because they cut the plant by hand just before maturity and carried it to the village for drying and manual threshing. However, this trait resulted in high field losses for U.S. farmers, who let their crop mature and dry in the field before harvesting with machines. Reduced shattering was important for mechanized harvesting in the United States.

The United States developed efficient technology for extracting oil from the soybean seed and processing it to prevent undesirable off-flavors, making it a useful and low-cost edible oil. U.S. research in livestock and poultry feeding using soybean meal combined with rising demand for meat and poultry products to create large markets for soybean meal in the United States and overseas. U.S. production and exports dominated these markets.

Breeders developed soybean varieties suitable for the daylengths of the southern United States. These varieties were also suitable for the temperate areas of Brazil and Argentina, and when soybean prices rose in the early 1970's their plantings expanded greatly. In the mid-1960's these two countries had about one-third of the soybean area in the Third World. By the mid-1980's this share had increased to three-quarters. The rapid expansion raised the growth of

soybean output much higher than the rate for cereal grains (figure 3).

Brazil and Argentina export soybean products. Their processing of soybeans into oil and meal has been facilitated by the transfer of large-scale processing equipment by multinational grain companies. Brazil and Argentina have captured a large share of world soybean trade from the United States (figure 4).

Soybean production is also of interest to many tropical countries. Soybeans can supplement protein-deficient diets, as in Indonesia. Soybean oil can be used to meet a rising demand for edible oils, as in India, the largest importer of edible oils in the Third World.

Figure 3

Rapidly Expanding Area Raises Soybean Output

% of 1967

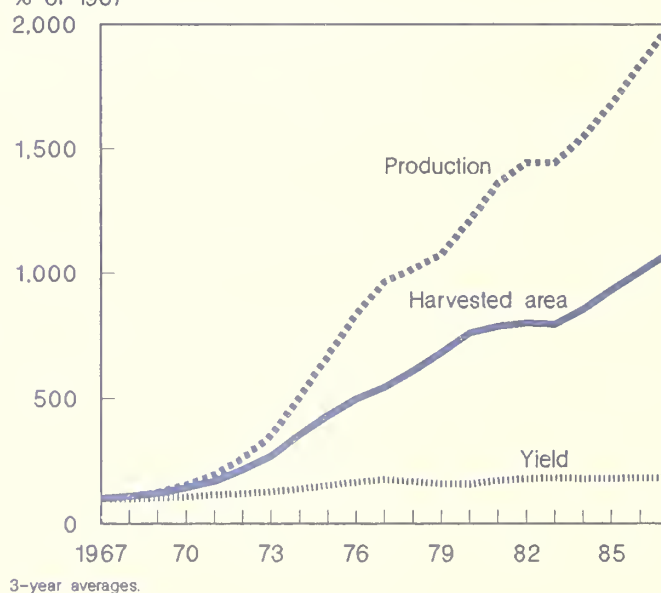
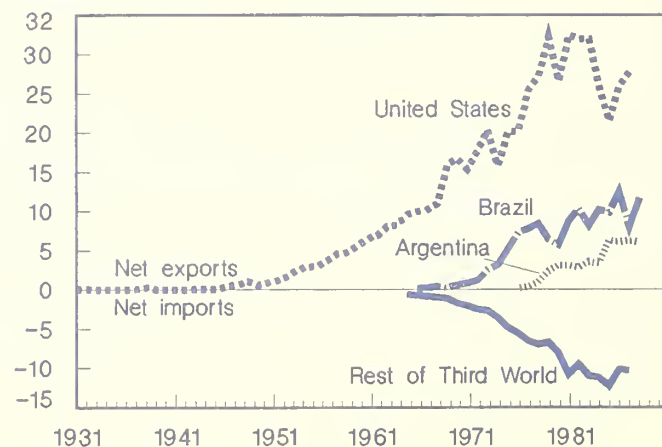


Figure 4

Soybean and Soybean Product Trade of the United States and the Third World

Million tons



However, it is difficult to transfer high-yielding U.S. varieties to the tropics of the Third World because most U.S. soybean varieties flower too soon in the tropics for good yields. The sensitivity of U.S. soybeans to daylength limits the latitude of adaptation.

The research effort required to develop new varieties and growing practices for the tropics is demonstrated by Brazil's attempts to extend its soybean production into its tropical areas. Brazil has had to create a soybean research organization with 300 full- and part-time scientists. Few developing countries are wealthy enough to devote so many scientists and the associated facilities and operating budgets to one crop. In comparison, the United States has about 350 people involved in soybean production research.

In those countries where consumers want more livestock products in their diets, the need for protein supplements raises the demand for soybeans for meal. Thailand is an example of a tropical country attempting to establish a soybean industry to supply its emerging livestock sector with domestically produced soybean meal.

Technology for Intensive Livestock Production Is Easily Transferred

With higher income comes increased demand for meat and livestock products. Domestic agriculture responds by developing intensive livestock industries and expanding feed grain output. In many countries, feed needs have grown faster than domestic production, necessitating imports. The rapidly increasing demand for feed has now raised feed use of corn and sorghum to equal food uses (figure 5).

Over two-thirds of the grains used for feed in the developing countries are fed to poultry and swine (2). Growth of broiler production has been particularly strong, with more feed-efficient birds, intensive poultry production units, and associated feed manufacturing.

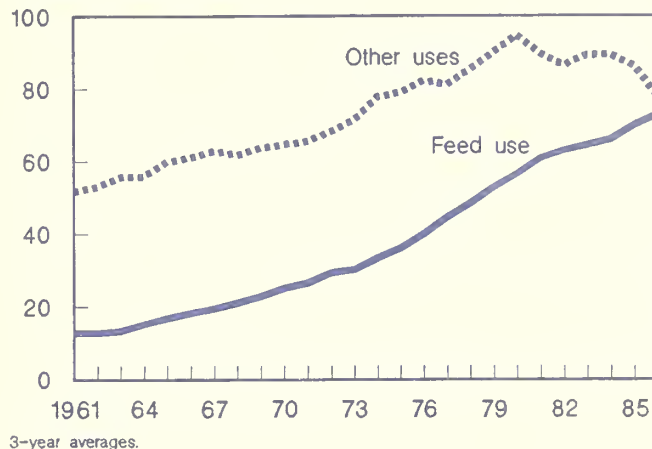
This rapid expansion of Third World poultry production is shifting trade patterns and substituting imports of grains for imports of chicken meat (8). Many countries are increasing grain imports to feed their rapidly growing broiler industries.

Chicken meat consumption has grown very rapidly in the higher income developing countries. Some were able to increase domestic production along with demand by using modern, imported technology. Other higher income countries became large importers of chicken meat because their broiler industries could not expand as rapidly as demand. The transfer of technology can shift such countries to imports of grains and other inputs needed to operate a modern broiler industry, because modern poultry production is not linked to the land and climate as is crop agriculture.

Figure 5

Third World Feed Use of Corn and Sorghum Now Equals Other Uses

Thousand metric tons



There are several advantages to converting feed into chicken meat in the consuming country rather than in the feed-producing country. Besides increasing employment and promoting development, international shipping of chicken meat, requiring refrigeration, is more expensive than the transport of the feed (7). Furthermore, because consumers usually prefer fresh chicken meat, it often sells for a premium over imported, frozen meat.

Technology Interacts with Climate, Land, and Economic Development To Shift Trade

New technology has dramatically improved the conversion of soil nutrients, water, and sunlight into grains and grains into animal products. The key for improved crop production has been new varieties. Where these have been used with adequate inputs, yields have doubled and tripled. However, new crop varieties suitable for one agro-climatic environment are typically not suitable for other environments (table 4) and a lack of water in semiarid areas may make heavy fertilization impractical.

The aggregate trade result for wheat and rice in the Third World has been a slight trend toward increased dependency on imports despite the dramatic gains in some countries. For corn and sorghum, the trend of import dependency is much steeper. Extending these trends into the future dramatizes the difference. (figure 6) Although part of the explanation for the steeper trend line for corn and sorghum lies with the slower rate of improvement of these grains compared with wheat (figures 1 and 2), the trend for coarse grains has been influenced mainly by the rapid rise in consumer incomes, leading to increased consumption of livestock products.

Third World agricultures often respond to these new dietary demands by developing intensive livestock industries based on technology from the developed countries. Because

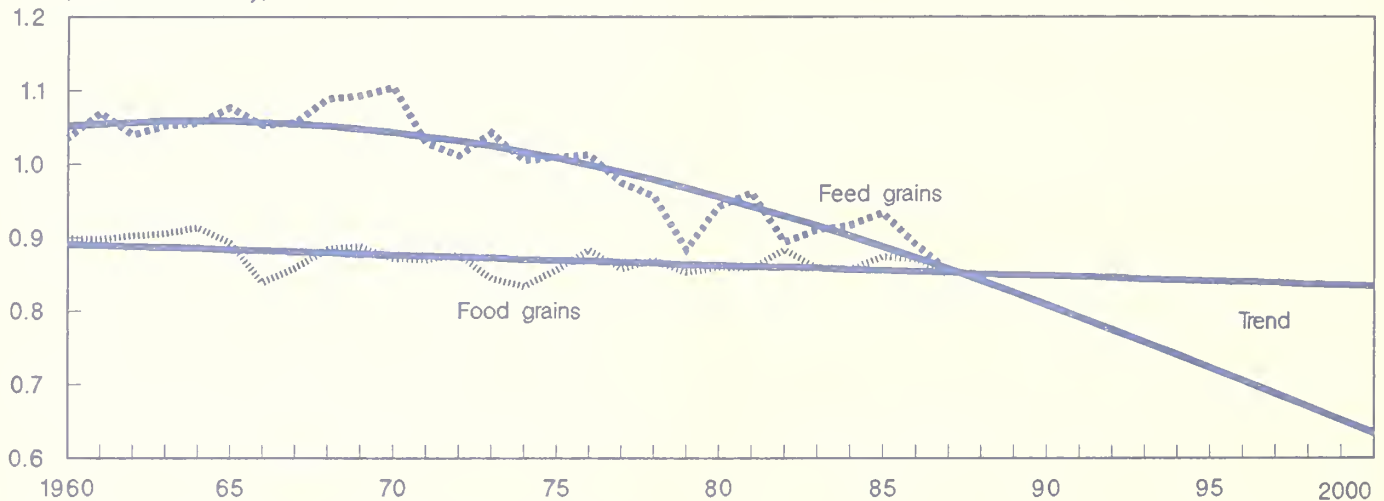
Table 4--Agricultural production technology for Third World

Commodity	Spread of new technology in Third World	Trade consequences for the United States
Food grains:		
Rice	Semidwarf varieties spread rapidly in irrigated areas. Besides raising yields, they boosted multiple cropping because of their short growing season.	Imports by major importing countries declined. Thailand, the major exporter, uses some HYV's (13 percent) (3), but their spread has been limited to irrigated areas.
Wheat	Original semidwarf varieties spread rapidly in irrigated spring-wheat growing countries. Researchers are improving other types of wheat. However, varieties have not been developed for the tropics.	Export competition from Argentina increased. Imports by spring-wheat countries declined. Increased imports by the rest of the Third World were greater than these lost markets.
Coarse grains:		
Corn	High-yielding varieties have been developed for many locations, but have proven difficult to transfer to other environments. Where corn is consumed directly, taste and color differences also limit transferability.	Export competition from Argentina and Thailand based on widespread use of improved varieties, 100 and 70 percent, respectively (2). Feed use outpacing production in higher-income countries, increasing their imports.
Sorghum	U.S. varieties transferred to Argentina and Mexico as feed grain crop. U.S. varieties are not useful where sorghum is a food grain because the taste and color is not acceptable.	Argentina competes with the United States to supply livestock feed markets.
Oilseed crops:		
Soybeans	Southern U.S. varieties were transferred to Brazil and Argentina. Brazil is now extending its area of production by developing tropical varieties. (U.S. varieties not suitable for the tropics.)	Export competition from Brazil and Argentina was facilitated by the transfer of processing equipment from developed countries. Imports by other countries are increasing.
Livestock:		
Broilers	Spread of modern technology is not limited by climate and land. Substantial foreign exchange is needed to import the technology.	Because the technology is easily transferred, modern broiler industries are established where there is demand, often creating grain import markets. Sometimes the increased broiler production replaces imports of chicken meat.

Figure 6

Developing Countries Are Becoming Less Self-Sufficient in Grains

Ratio(1 = self-sufficiency)



Ratio is grain production divided by the sum of grain production and net imports.

this technology, notably in the poultry industry, can be transferred so easily, Third World countries can quickly expand their livestock production, outstripping local feedstuff production. These shortfalls have created large and growing import markets for grains and also for protein supplements.

Third World use of soybeans as protein supplements and edible oil is rising with higher incomes, but is less than the combined output of Brazil and Argentina, whose large land areas are well suited for soybean production. The easy availability of processing equipment has allowed these countries to become very competitive with U.S. exports.

Summary

Rising crop and livestock productivity through technological advances is inevitable as Third World countries develop. There is concern that the use of new technologies to enhance Third World agricultural productivity countries is reducing potential U.S. markets.

Markets for some commodities have disappeared as agriculture becomes more productive in developing countries, raising yields and output of those crops in which they have an advantage. New markets appear and grow when rising incomes from economic development transform a potential demand for better diets into actual demand. Few developing countries can improve their agriculture fast enough to keep up with rapidly rising demand for all the foods in improved diets. These shortfalls have led to growing import markets in many Third World countries, which in turn may lead to greater opportunities for competitively priced U.S. exports.

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THE U.S. FOOD ASSISTANCE PROGRAM: A REVIEW OF THE LAST FIVE YEARS

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Abstract: Shipments under P.L. 480 have maintained a relatively steady share of between 3 and 5 percent of total U.S. agricultural exports over the past 5 years, accounting for 4 percent in fiscal 1988. The commodity mix and recipient countries, however, have shifted somewhat over this period. Shipments for fiscal 1989, particularly of corn and wheat, will be affected by the U.S. drought in 1988, since U.S. commodity prices have risen and stocks have tightened.

Keywords: Food aid, agricultural exports, market development .

Since 1954, the Agricultural Trade Development and Assistance Act (Public Law 83-480) has shaped the U.S. food assistance program. Although some of the provisions of the "Food for Peace" or P.L. 480 program have changed over the years, three major objectives have remained constant. These are: (1) promoting international trade, specifically to expand markets for U.S. agricultural products; (2) providing humanitarian relief and aiding the advancement of developing countries; and (3) promoting U.S. foreign policy.^{1/}

Title I of the act provides for U.S. Government financing of sales of U.S. agricultural commodities to friendly developing countries on concessional credit terms. Sales are made by private firms in response to invitations for bids issued by the importing country. Title I sales may not disrupt normal commercial trade. Each country's Title I program is negotiated through diplomatic channels with input from the Departments of Agriculture (USDA), State, Treasury, Commerce, the Agency for International Development (AID), and the Office of Management and Budget. The implementation of P.L. 480 Title I is the responsibility of USDA's Foreign Agricultural Service.

Title II, the food donation program, is used to alleviate hunger and malnutrition in the developing world. Title II is administered jointly by AID and USDA. Voluntary agencies such as Catholic Relief Services and Save the Children Federation, international organizations such as UNICEF and the World Food Program, and the governments of recipient countries help distribute Title II food donations.

Title III, the "Food for Development" program, was added to the act in 1977 and allows foreign governments to purchase U.S. agricultural commodities on Title I loan terms. However, instead of paying the United States for the commodities, countries may use the commodities or the proceeds

from local sales for pre-arranged agricultural self-help projects. A country must be eligible for Title I, and must show achievement of certain agricultural reforms, to be eligible for Title III assistance.

Commodities are also donated under the authority of Section 416(b) of the Agricultural Act of 1949. This authorizes the Commodity Credit Corporation (CCC) to donate commodities acquired through U.S. price support programs. Eligible commodities may be donated overseas through channels similar to those for P.L. 480 Title II. Section 416(b) commodities have often been sold by recipient country governments in order to promote development activities. Commodities have been distributed through this program since fiscal 1983, with about 1.8 million metric tons donated in fiscal 1988. Assistance under any of these programs must not disrupt normal commercial trade. At least 75 percent of all commodities shipped under P.L. 480 and Section 416(b) must be shipped on U.S.-flag carriers to satisfy requirements of the Cargo Preference Act.

While P.L. 480 is an important exporting tool for the U.S. Government, one of its implicit goals is to move countries away from the program and expand the market for commercial sales. Some important U.S. trading partners, such as South Korea, began as P.L. 480 recipients. For such countries, market-oriented export programs which provide credit guarantees are serving as a link toward increased commercial sales.

Total P.L. 480 exports have maintained a relatively steady share of between 3 and 5 percent of total U.S. agricul-

^{1/} For more on the history of P.L. 480, see U.S. Department of Agriculture, Foreign Agricultural Service, Foreign Agricultural Economic Report No. 212, December 1984; and Susan Epstein, "Food for Peace, 1954-1986: Major Changes in Legislation," Congressional Research Service Report, revised April 30, 1987.

Exports under U.S. food assistance programs					
Fiscal year	P.L. 480			Section 416	Total U.S. agricultural exports
	Title I & III	Title II	Total		
	Million dollars				
1984	775	602	1,377	129	38,027
1985	928	698	1,626	279	31,201
1986	766	420	1,186	147	26,324
1987	696	248	944	133	27,900
1988	716	684	1,400	NA	35,500
NA = Not available.					

NA = Not available.

tural exports over the past 5 years, accounting for 4 percent in fiscal 1988 (table). The commodity mix and recipient countries, however, have shifted somewhat.

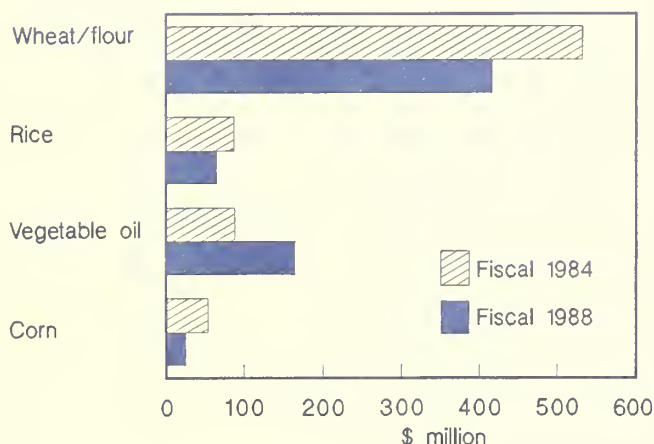
Title I Commodity Mix Shifts

In fiscal 1988, P.L. 480 Title I agreements were valued at \$721 million, with actual sales recorded at \$716 million. Of the total Title I sales registered, wheat and wheat flour accounted for 58 percent, vegetable oils 23 percent, and rice 9 percent, with feedgrains, cotton, tallow, oilseeds, and soybean meal making up the remaining 10 percent.

By comparison, in 1984 wheat and wheat flour accounted for 69 percent of the Title I exports, rice and vegetable oil were second and third in importance with 11 and 10 percent respectively, and feedgrains and cotton composed the remaining 10 percent (figure 1). The changes worth noting include the increasing importance of vegetable oil, the 11--percentage point drop in wheat and flour exported under the program, and the addition of tallow and soybean meal to the list of program commodities.

The reduction in wheat and flour exports under the Title I program can be attributed to several factors. Large wheat importers such as Egypt and Morocco reduced their Title I imports of wheat by 329,000 and 150,000 metric tons, respectively, for 1984 to 1988, satisfying their needs through other U.S. export programs or from other sources. Some

Figure 1
P.L. 480 Title I/III Exports by Commodity



African countries such as Liberia, Guinea, and Madagascar have shifted to wheat imports through the Title II program.

Vegetable oil exports have risen under Title I, largely owing to increased exports to Pakistan. In part this reflects expanded U.S. assistance efforts. Exports to Pakistan have fluctuated over the 5-year period, reaching a low point in 1987 because of a buildup of soybean oil stocks. However, U.S. soybean oil exports to Pakistan under both the Title I and export credit guarantee programs rebounded in 1988 as internal stocks became depleted.

Exports have been affected by the Pakistan Government's policy of supplying soybean oil to the Ghee Corporation, the major manufacturer of the local form of cooking oil, at competitive rates. This policy has reportedly led to a change in the blending ratio used in ghee production. The ratio of soybean oil to palm oil changed from 40/60 to 60/40, leading to a doubling of U.S. soybean oil exports to Pakistan. U.S. export programs have helped to cultivate local taste preferences.

Vegetable oil exports under Title I have also increased as a result of entry of new participants into the program. Morocco, a longstanding P.L. 480 wheat recipient, began importing vegetable oil in fiscal 1987 and is now the second largest importer of vegetable oil under the Title I program.

Shifts in Title I Regional Distribution

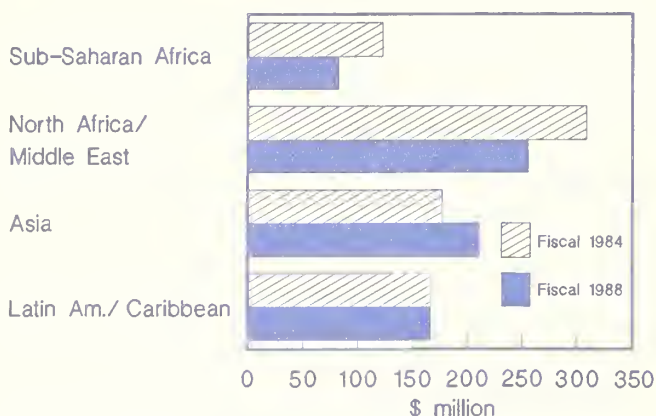
Although the total of Title I exports has remained stable over the past 5 years, regional shifts have occurred (figure 2). Asia has shown the greatest increase, from 23 to 30 percent of the total. The relevant countries in this region include the Philippines, Indonesia, Bangladesh, and Sri Lanka. Latin America and the Caribbean remained steady at 21-23 percent of the total, while decreases were noted for North and Sub-Saharan Africa and the Middle East. Serious foreign exchange problems and management difficulties have delayed many Sub-Saharan country programs, and resulted in some shifts from Title I to Title II. Some North African and Middle Eastern countries have decreased their Title I imports and are currently participating in other, more commercially oriented U.S. export programs.

Recent Changes in Legislation

Several changes were made to the P.L. 480 legislation under the Food Security Act of 1985. These changes were aimed at encouraging private enterprise and food security in developing countries, as well as providing nutritional assistance. The local currency initiative, the new Section 108 of P.L. 480, promotes the development of private enterprise through the use of financial intermediaries within the recipient country. Importing country governments pay the United States in foreign currency for agricultural com-

Figure 2

Title I/III Shipments of P.L. 480 Commodities: Regional Shipments



Total 1984 Title I/III exports: \$775 million. Total 1988 Title I/III exports: \$716.2 million.

modities under Title I. That currency is then loaned by the U.S. Government to financial intermediaries to be used to finance individuals, corporations, or cooperatives in the importing country. Emphasis is given to providing loans to agricultural enterprises. In 1988, Title I agreements with a local currency component were signed with 4 countries, for a value of \$14.6 million.

The "Food for Progress Act," also part of the 1985 Food Security Act, encourages countries that have taken steps toward free enterprise in agricultural trade by making these countries eligible for U.S. commodities through multi-year or single-year agreements. The CCC carries out this program by either making stocks available under Section 416(b) or using funds appropriated for Title I. In fiscal 1986, agreements were signed with Madagascar and Guinea for rice, and in fiscal 1988 an agreement was signed with Ecuador for sorghum.

Minimum tonnage of commodities distributed through Title II was increased under the 1985 act to 1.9 million tons (grain equivalent basis) for each of fiscal years 1987 through 1990. In addition, more processed and protein-fortified products have been designated for distribution through Title II, part of nutritional assistance to developing countries.

U.S. Food Assistance and Other Export Programs

The P.L. 480 program does not operate in isolation from other U.S. export programs. Several P.L. 480 recipients purchase commodities under other programs, such as the export credit guarantee programs and the Export Enhancement Program (EEP).

Changes legislated by the 1985 act, other than those made to the P.L. 480 program, have had a positive effect on U.S. agricultural exports. These include export initiatives such as

the EEP, the Targeted Export Assistance Program (TEA), expanded export credit guarantees, and other changes to help U.S. producers be more responsive to market signals and more competitive in world markets.

North Africa and Middle East countries, including Egypt, Morocco, Tunisia, and Yemen are examples of countries for which food assistance has led to greater participation in U.S. export programs and increased preferences for U.S. products. About one-third of these countries' fiscal 1987 wheat imports from the United States were under the P.L. 480 program (figure 3).^{2/} In the face of subsidized competition, mainly from the European Community, importers of U.S. wheat in these markets purchase using a combination of the export credit guarantee programs and the EEP. This helps strengthen U.S. market shares in those countries. Food aid through P.L. 480 may have contributed to subsequent commercial exports to these countries. The combination of food aid and export programs helps meet food needs in recipient countries, as well as building markets for U.S. commodities.

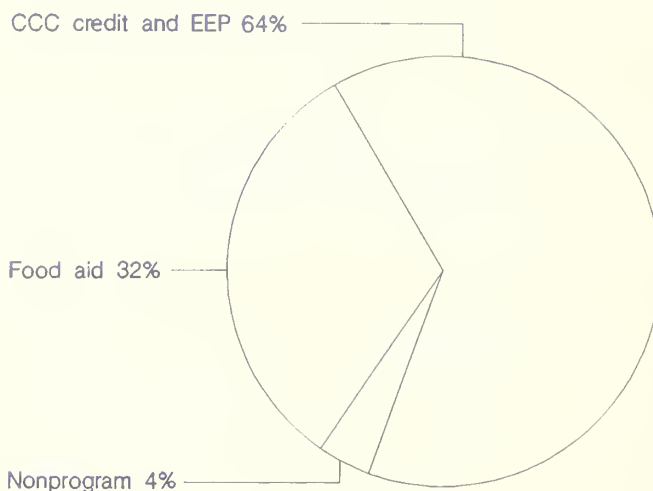
Future Outlook for U.S. Food Assistance Programs

Food aid shipments for fiscal 1989 will be affected by the drought in 1988, since U.S. commodity prices have risen and stocks have tightened. These price increases will reduce the tonnage that may be programmed with available fiscal 1989 funds. Title I commodities most affected are corn and wheat. At projected 1989 prices, Title I corn exports are expected to drop 53 percent in volume, and wheat 2 percent. Fortunately, winter wheat and rice production were virtually unaffected by the drought.

^{2/} Fiscal 1987 data are the latest available at the time of writing.

Figure 3

Fiscal 1987 U.S. Wheat Exports: N. Africa/Middle East Food Aid Recipients



U.S. total=4,610,263 metric tons.
Includes Egypt, Morocco, Tunisia, and Yemen.

To help maintain wheat exports under the food assistance program, the President has authorized use of up to 1.5 million tons from the Food Security Wheat Reserve. While most of the Reserve wheat will go toward the Title II program, some will be used for Title I. The balance of wheat needed for these food aid programs will come from private commercial suppliers.

COUNTRY BRIEFS

Rice Millers' Petition Rejected

United States Trade Representative Clayton K. Yeutter on October 28 rejected an unfair trade petition from the American Rice Millers' Association calling for an investigation into charges that Japan's near-total ban on rice imports is unfair and actionable under the General Agreement on Tariffs and Trade (GATT). The petition also asked that foreign exporters be allowed a 10-percent share of Japan's rice market over a 4-year period.

Instead, Ambassador Yeutter said he would press Japan to open its market as part of the longer term trade liberalization sought in the Uruguay Round, and warned that if Japan did not demonstrate a commitment to this end at a midterm GATT meeting in Montreal in December, he would reconsider his decision.

"In my judgment," Ambassador Yeutter told a news conference on October 28, "acceptance of the petition would so tarnish the relationship between the two nations that it would lead to counterproductive results not only in agriculture but a whole lot of other activities."

Japan's Agriculture Minister Takashi Sato, however, reiterated on October 29 that Japan will not liberalize its rice market. Sato told reporters in Tokyo that there is no change in the Government's self-sufficiency policy, which he termed "basic foodstuffs for the national security."

Although rice is only a small component of Japan's economy, the Government-sanctioned agricultural cooperatives wield great political power in Tokyo, and so the rice import ban is an issue that is not very amenable to change based on economics.

A leading Japanese agricultural economist, Professor Yujiro Hayami of Aoyama Gakuin University, was quoted by the New York Times as saying "All this talk about rice self-sufficiency and national security is propaganda. Rice is a welfare program for the cooperatives, nothing else."

He was referring to the estimated \$4.4 billion in subsidies that the Japanese Government is providing this year. Under the Japanese system, the Government sets a price at which it buys about one-half of the rice crop from farmers. Then it

sets a lower price (or did until 1987, when wholesale prices were set above purchase prices) at which it sells the rice to wholesalers. Both figures are kept artificially high.

The perception that rice is integral to Japan's national well-being, according to the New York Times, is fostered by the Central Union of Agricultural Cooperatives, known as the Zenchu. The cycles of planting and harvesting rice are still celebrated in Japan in ancient Shinto rites and town festivals.

Per capita consumption of rice in Japan has fallen, however, by about one-third since 1955, when it was about six bowls a day, or 220 pounds a year. [Arthur J. Dommen with Lois A. Caplan (202) 786-1610]

Agricultural Trade Liberalization On a Rocky Road in Taiwan

Taiwan, the fifth largest overseas market for U.S. farm products (U.S. exports totaled \$1.4 billion in fiscal 1987) has been on an uneven path toward import liberalization, with agriculture the object of fewer policy initiatives than other sectors. Recently-announced tariff cuts on 331 items included only three agricultural products (meat soup/broth, mint oil, and sauces and seasonings other than soy sauces, tomato ketchup, curry paste, and sweet osmanthus paste), and excluded the 102 agricultural items sought for inclusion by the United States in April.

Spurred by a 19-percent currency appreciation, Taiwan's agricultural imports surged in 1987. Fresh fruit imports jumped 53 percent to about 148,000 tons along with a 14-percent increase in domestic production. Similarly, turkey meat imports unexpectedly jumped from 16 tons in 1986 to 2,900 tons in 1987, depressing farm-level poultry prices.

In response, farmers took advantage of new political freedoms created by the lifting of the 38-year martial law in July 1987 by, for the first time, publicly protesting the Government farm policy, particularly regarding import liberalization. The protests climaxed on May 20, 1988, when people (including farmers) rioted in the streets. Taiwan suspended fruit imports from all countries other than the United States and banned turkey imports. In the 1988 tariff schedule, Taiwan also rolled back most of the duty reductions made over the years.

Faced with overproduction and farmers' protests, recently-installed President Lee Teng-Hui, who was born on a farm in Taiwan and holds a doctorate in agricultural economics, has been sympathetic to the farmers' plight and has not openly opposed import restraints. Moreover, drought followed by a severe flood last August further strengthened sentiment for protecting income of farm producers by maintaining import restrictions on agricultural products. [Sophia Wu Huang (202) 786-1613]

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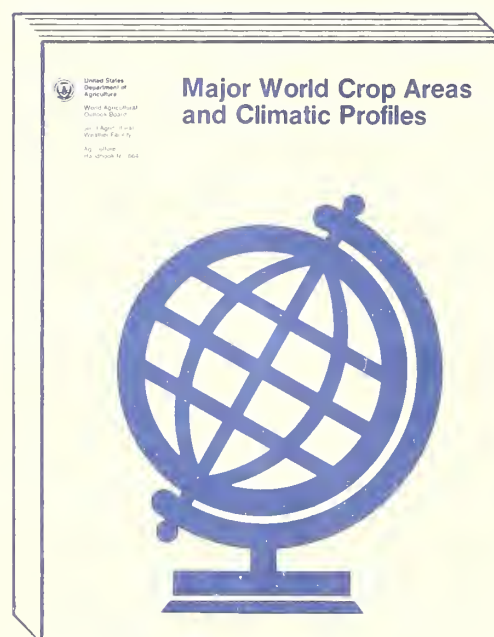
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